..THE IRON AGE..

MAY 11, 1933

ESTABLISHED 1855 Vol. 131, No. 19

Today's Need—More Planning and Less Executing

By C. F. KETTERING
Vice-President, General Motors Corpn.

ADMITTEDLY we are in an abnormal place today. We are just as far as we can get from the abnormal place in which we found ourselves in 1929. Yet some people are saying that America is finished. Nonsense. These pessimists are the same people who are annoyed at the constant change of roads, the detours, the oncoming of new car models and the swift obsolescence of machinery and ideas. Can't they realize that our deep-rooted dissatisfaction with things as they are today is a sure sign that we will emerge from the present depths? After all, dissatisfaction more than anything else breeds progress.

Formerly we believed the flow of goods through channels of trade to be good business. However, we failed to recognize that short-term credit and money were the two controlling and stabilizing factors. Recently materials and useful goods have become of less value to people than money. The unfortunate and unreasoning thing is that money has become abnormal in value and we have been trying to appraise the country's wealth in terms of currency. For most practical purposes, the agency of short-term credit has ceased to function. It must be restored.

Unwise to Shackle the Future to the Past

To get on to a sound basis, so that in the future we will avoid a repetition of the post-war excesses, we must do more planning and less executing. In all of our agencies, government and business alike, we have foolishly tried to spend the next generation's money as well as our own. We have attempted to saddle on our children a terrific debt burden, not seeing that eventually in the process we might strangle ourselves. When we wanted something today which could not be paid for out of current revenues, we decided to charge it to tomorrow.

Municipalities and other governmental units have issued bonds for improvements to be retired long after the usefulness of the projects had ended. Railroads have financed their programs by means of bonds many of which do not mature until the year 2000 or later. This is so far into the future that none of us knows whether railroads then will still be our chief means of transportation, or whether they will even exist. Indeed it was not many years ago that people would have laughed at a prediction that by 1933 trolley cars would almost have disappeared from our city streets.

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BUSINESS and government, like the steam engine, must be equipped with a governor which will prevent them from adopting any program which does not pay for itself within its lifetime, says Mr. Kettering in this article, written exclusively for The Iron Age.

Industry will begin to prosper again when it offers people products which they want more than anything they now have. In the creation of these products research will play a major role. Research is just as vital to industry as engineering, production, finance and sales. We must originate new ideas and new products. We must do more planning and less executing.

Our dissatisfaction with things as they are today is a sure sign that we will emerge from the present depths, for dissatisfaction more than anything else breeds progress.

The development of the machine will not halt. It will play an ever-growing part in bringing on to the market new products at reasonable prices which people will want.

The steam engine contains a great deal of potential energy. This is of tremendous value so long as the energy is properly controlled. If we let the engine run wild, no one derives any benefit from it. Hence we put a governor on it to keep its operation within desirable bounds. We must take the same steps to regulate our business and governmental engines. Each must be equipped with a governor to keep it from mortgaging the future and thereby impoverishing the entire country. That governor is the rule that no program shall be adopted which does not pay for itself within its lifetime. If we had equipped our business and government engines with such a governor long ago, we wouldn't be in our present jam.

Must Allow Free Play for Change

It is not fair, it is not even good sense to lay down a program too far into the future. That is because tomorrow always differs from today. We sometimes forget that desires, customs and our general mode of living change rapidly. Remember these simple, but seldom considered facts: The day that you were born everyone in the world was older than you; one year later there were two and a half million Americans younger than you; at the age of 26 there were just as many people younger as older, but you still were looking to older people for guidance. At that age you should have turned half way around and looked at the younger generation. Because you didn't you thought that generation bad. Exactly the same thing was said about you.

At 50, when you are supposed to be a sage and are still looking to those older than you for guidance, the only fellow you can see is the under-

taker. You should turn around and look at the hundred million people who are younger than you and who have new ideas and want new things. If you can't learn from the younger generation at 26, your ideas are already beginning to petrify. You must realize that each new generation comes into the picture without knowing some of the hardships experienced by the preceding generation.

To your father the conveniences of a modern bathroom were a luxury; to you they are commonplace. To you the airplane and radio are triumphs of modern science; to your children they have no awe-inspiring associations. Your children probably look up at an airplane less often than you. This difference in point of view is brought about by the sometimes imperceptible fact that the world is in a constant state of change. This, however, is nothing to cause alarm. On the other hand, it is proof of progress. Satisfaction is the worst enemy of progress and is one of the world's worst diseases.

People Buy What They Want, Not What They Need

The engineer doesn't understand how it is possible to build something today and sell bonds due in 50 years to pay for it. The reason is that he doesn't believe any human being today can tell whether he will need a building 25 years from now, let alone 50 years. So in the past we had a generation of people who seemingly thought that they were the smartest set the Lord ever created and that they would tell the world how to operate in the future as well as in the present. They were wrong, because we are going to have people tomorrow just as smart as we are today. I do not believe it possible to set up rates on capital 50 years ahead. The world will change too fast for that. We need to shorten our conception of the future.

There is no magic way out of the depression. Industry will begin to prosper again when it offers people articles which they want more than they want anything they now have. The fact is that people never buy what they need. They buy what they want. You may need a washing machine, but buy an automobile instead, because you wanted it more than you wanted the washing machine. If you really wanted the washing machine badly enough at the time you first needed it, you would have managed somehow to purchase it. The point is that the more you want things, the quicker you will get them. So it is with people collectively as well as individually. When we start making products which they want more than anything else, they will not hesitate to spend their money and start the wheels of industry turning anew.

In the creation of these products research will play a major role. Research, after all, is simply trying to find out what we are going to do when we can't keep on doing what we are doing now. Research, looking toward the discovery of new human needs, is the one thing which will give us the flexibility necessary to keep up with the change inherent in all life. What industry needs now is architects to provide its engineers with the blueprints from which to build the economic house of the future.

Research owes its whole existence to trouble, and out of trouble grows progress. It is when trouble comes along that we can best locate the weaknesses in our economic system and correct them. To this end research contributes much.

The chief job of research is to make in an economic and orderly rather than a haphazard way the changes necessary to keep pace with our constantly changing standards of living. The research man is striving to meet tomorrow's requirements, and in so doing regards everything today as out of style. How to use time economically is one of his knottiest problems. It takes most organizations three to four years to reorient themselves to new products; thus the products must be worked out three to four years ahead of the time when they are to go into production.

Research Depends on Brains, Not Equipment

Elaborate and costly apparatus does not solve the research problem. It is solved in a man's head. The apparatus is useful only so far as it is a means of testing the research man's ideas. In other words, the more brains he has the less material he needs.

Typical of research is the tendency to shift the burden of proof to the product. A friend of mine in the steel business used to send me little pieces of steel he had made. One day he sent me a pretty hard piece. I gave it to one of our men to drill. He wasn't able to drill a hole through it until he used a diamond drill. This wasn't because the steel was too hard, but because the first drills he used were too soft. That is the way you will find it with your research staff. Among the men you will discover several soft drills. They will want to pass along the blame to the material rather than place it where it belongs, on their own lack of ingenuity.

Research is just as vital to industry as engineering, production, finance and sales. In fact, some of the money heretofore spent on manufacturing must be diverted in the future to planning for what is to come. Each company, however, must analyze its own research requirements, because after all if research doesn't pay something, if it doesn't lay the foundation for new business, it should have no place in industry.

Unfortunately the tendency of civilization is to standardize. I do not object to standardizing materials which go into gears, but I do object to standardization of ideas and to cutting the pattern of the future from the knowledge of today. Standardization, in its relationship to industry, is wrong when it retards development or brings it to a halt. Because of our almost incredibly swift means of communication, standardization has made unusually rapid progress and its dangers become more apparent. Think of the tunes we whistle. As soon as a song appeals to the public's fancy, it is brought to us daily by radio. Think how deadly it would be if everyone whistled the same tune for ten years. The reason we don't is because we demand change. It is our desire for something new that puts Tin Pan Alley to work providing us with new tunes.

Adversity Stimulates Progress

Our greatest strides have been taken during times of national emergency. When we believed our national life was threatened in the war, we got busy and did something. After the emergency disappeared, we abandoned further development in favor of exploitation. Now we are in the midst of a great economic crisis, an emergency just as great as in war, and once more we are showing signs of a revival of spirit and of development of new ideas akin to those in war days.

In the automobile industry we have carried on through the depression with undiminished vigor. We know that time itself wipes out the value of any product. We believe that yearly models are the right thing, because only by bringing together the accumulation of the year's work and wrapping it in a new package can we serve our trade properly. The perfect automobile of last year has lost at least ten per cent of its value through the time element alone. The loss of value cannot be attributed to depreciation of materials, but to appreciation of our own needs and desires.

Pessimism Reflects Lack of Vision

There are some so pessimistic as to believe that there will be nothing new under the sun to stimulate industry as the automobile and the radio have done. They are without vision. They do not realize that there are a myriad of things left to be done by mechanization, although the need for them may not be obvious now. Mechanization actually has been a great boon to society. It has made possible the production of many articles which would not have been available to the masses had they not been manufactured largely by mechanical means at low cost. The development of the machine will not halt. It will play an ever-growing part in bringing onto the market new products at reasonable prices which people will want.

One can readily picture the developments which lie before us. The automobile of 20 years from now will no more resemble the present automobile than today's car resembles that of 1910. We have a long way to go

in housing. In fact, the changes in the next quarter century are likely to be so great that no one will be content to live in the house as it is today. Railroads will be revamped and the services they will offer may not be akin to those of 1933, so many improvements will have been put into effect.

Population Shifts Will Create New Demands

A depopulation of our great cities, which I think is coming in time, will mean much in the way of construction and of development of new products and new services. Why should people be huddled together in metropolitan areas? That they don't relish such crowding is evident from the way in which they rush in the summertime to parks and other outdoor gathering places, where they can be in the sunshine and fresh air and commune with nature, even if for only a short time.

I foresee the day when these people, in family groups, will occupy perhaps half an acre of land in the country, where they can have all the advantages of a healthy, outdoor life and raise part of their food. Instead of congested cities with double-decked streets, as some predict, we probably will have a spreading out of our urban population so that workers may live 40 to 50 miles from their place of employment. They will drive back and forth to the city factories in their cars, perhaps in groups of four and five to a car, over express highways unhampered by traffic lights and crossroads. Speeds of 90 to 100 miles per hour will be common on these highways, thus enabling a factory operator to get home from work in half an hour. With such an outpouring of families from the bottlenecks of the cities to the rural regions, the nation would live a saner, more normal life, yet our modern conception of industry would go on.

I am not discouraged about the present situation, probably because my impressions come largely from the industry in which I am working. Investigation shows that many utilities have made their most rapid progress in the second 25 years of their existence. This was true of the electric light, with the development of the tungsten lamp in the second quarter century and the unprecedented growth in the use of electric lamps and other electrical products. It also was true of the telephone. In the second 25 years came the perfection of ship-to-land communication and the swift extension of long distance service in general. Perhaps it is significant that another utility, the automobile, is just now entering its second 25-year period.

Possibilities of Materials Barely Tapped

Our industry has been made possible by three important factors—rubber, alloy steel and petroleum products. We couldn't build an automobile without rubber. The rubber industry has made tremendous strides in the last few years. Durability of tires has gone up from a small mileage to many thousand miles. Today we are understanding more about rubber than we ever have before and are using it in our work as we thought we never could.

THE guiding genius of General Motors Research Laboratories, C. F. Kettering was born on an Ohio farm 56 years ago, was educated in country schools and graduated in engineering from Ohio State University in 1904. After serving a number of years with National Cash Register Co. as inventor and engineer, he became associated with Edward A. Deeds and other gentlemen in organizing the Dayton Engineering Laboratories at Dayton, Ohio, to manufacture one of his most important inventions, the Delco starting, lighting and ignition systems for automobiles. He is also universally known as the inventor of the Delco-Light farm lighting system. His list of achievements is too long to enumerate here. Many patents and scientific developments which resulted in new industries came from his far-sighted scientific vision. He is the recipient of numerous honorary degrees; in 1929 Ohio State University awarded him the Sullivant Medal, given every five years to the alumnus who has accomplished noteworthy results in science, engineering, literature or the social sciences.

We are just beginning to find the possibilities in alloy steel. We already know that it will stand stresses and strains far beyond the limits of a few years ago and there are indications that we have not yet, by far, reached the end. Petroleum, meaning all gasoline and liquid fuels, has just come into its own. With our new knowledge of lubrication it is possible in the lubricating oils to increase bearing pressures as much as 200 per cent. The petroleum industry, in fact, is just beginning to think about its potentialities.

Thus we must cast aside the prejudice we have against changing our minds. We are all of us as if by instinct intolerant of that which is unfamiliar. We have arrived at our present situation through over-exploitation and lack of advance thinking to determine what we were going to do when the job at the moment was finished. We can never expect to go ahead until we recognize that change, and not static conditions, is the fundamental thing in life. Life isn't just an existence. It is evolution. To be prosperous we must keep pace with it. We must originate new ideas and new products. There is where research comes in. Again I say, let's do more planning and less executing.

Scrap Iron Broken In Blasting Pits

Armored blasting pits for breaking scrap iron to furnace size have recently come into use in Europe. The development is described by Rudolf Feuchtinger in a recent issue of *The Explosives Engineer*.

One of the large pits for this type of work is situated at a steel plant in Essen, Germany. Ingots, cast iron pieces and iron waste from foundries are broken into convenient sizes by explosives. The blasting pit is 25 ft. long, 18 ft. wide and 13 ft. long. Its walls are lined with steel plates 1 ft. thick. Three large steel slabs, 1 ft. thick, and weighing a total of 83 tons, cover the pit. The cover plates are equipped with valves for releasing the explosives gases.

In order to place the explosives charges in the large blocks of iron and steel, holes are burned into them by oxygen torches. The large pieces are then brought into the blasting pit by means of an electro-magnetic hoist and the dynamite loaded into the holes. After covering the pit with the heavy steel plates the charges are fired by an electric blasting machine.

The process avoids the precautions and great space necessary to blast large cast iron steel pieces in the open, and has been found to be considerably more economical than hammering and other methods, says the writer of the article.

Russia will be a growing market for foreign machinery and tools for many years to come, according to Paul Winterton, in the *Ironmonger*, London. He holds that a recent decree forbidding importation of railroad equipment, cranes, pumps, compressors, turbines, electrical furnaces and the like, on the ground that they can be obtained from Soviet sources, is not likely to be interpreted too rigidly. The road to metallurgical efficiency will prove, he asserts, long and arduous.

Radiographic Examination of Pressure Vessel Welds

APPROXIMATELY 21,000 ft. of welded joints in pressure vessels ranging in thickness from less than 1 in. to more than 4 in. have been X-ray inspected at the Babcock & Wilcox Barberton plant in the past two and one-half years. The assurance of sound welds made possible by such scientific procedure undoubtedly has greatly furthered the acceptance of pressure vessel welding. Methods employed in this work, including the technique of obtaining radiation pictures, are outlined in this article.

By R. E. HILLER
Babcock & Wilcox Co., Barberton, Ohio

THE rapid advances in the use of welding for construction of pressure vessels have resulted from those improvements in the welding art that have produced the uniform deposition of sound, ductile weld metal. Even with improved technique and expert operators, however, the large number of physical variables, along with the personal factor, permits defective and dangerous welds to be deposited and accepted, unless the weld is examined by a suitable non-destructive testing method.

A large number of methods have been tried for the non-destructive testing of welded joints; these include sonic methods by use of the stethoscope, various methods depending upon magnetic and electrical properties, and radiation methods by use of X-rays and gamma rays. Of these various methods, that using penetrating radiation has proved most satisfactory. It is readily adaptable to routine inspection; is sensitive to small defects in even very thick sections; its results are readily interpreted and carry assurance to even an inexperienced observer; and it provides a permanent record of the examination.

The penetrating radiations known as X-rays and gamma rays are electromagnetic waves of the same nature as visible light, differing only in wave-length. Visible light consists of wave-lengths 7700-3900 angstrom units (1 angstrom unit equals 1/100,000,000 cm.), X-rays from industrial tubes of wave-lengths 1019-0.04 a.u., gamma rays of wave-lengths 1.4-0.01 a.u. These short wave radiations differ in behavior from light in that they are not appreciably reflected or refracted as they pass through matter. As the wave-length decreases, the penetrating power increases until, with the short gamma rays, 8 to 10 in. of steel can be penetrated.

X-rays are produced in the sudden stoppage of fast-moving electrons by matter. The high vacuum X-ray tube of the usual type accomplishes this by producing an electron emission with a heated filament and by impinging these electrons on a metal target. The speed with which the electrons bombard the target is dependent upon the voltage difference between filament and target, the greater the voltage the greater the electron speed and the shorter the resultant X-rays. The penetrating power of the rays is controlled by regulation of the voltage at which the tube operates.

Gamma rays are produced in the spontaneous decomposition of the atoms of radioactive elements. The two most common elements used as sources of gamma rays are radium and radon, or radium emanation, a gas obtained from radium. The rays of greatest intensity from these elements are equivalent in wave-length to X-rays produced by 1,000,000 to 1,500,000 volts. As a source of radiation, radium may be used for 1750 years with the loss of only one-half its intensity, radon or radium emanation loses one-half its intensity after 3.8 days.

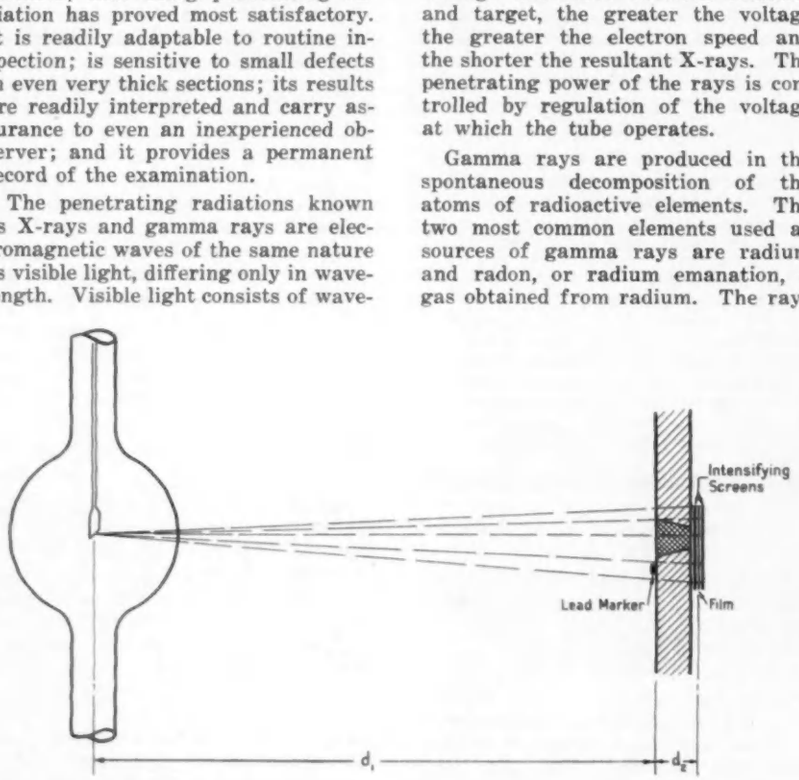


Fig. 1.—Diagrammatic arrangement of the source of radiation, metal section and film.

Method of Obtaining Radiographs

The technique of obtaining radiation pictures or radiographs is essentially the same for both X-rays and gamma rays. The source of radiation is placed at a distance from one side

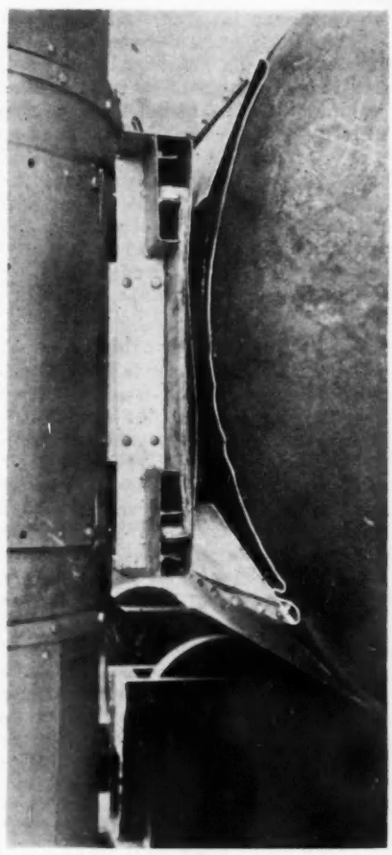


Fig. 2.—200,000-volt apparatus set up for examining a girth seam. The close-fitting lead-rubber shielding is for protection from secondary radiation.

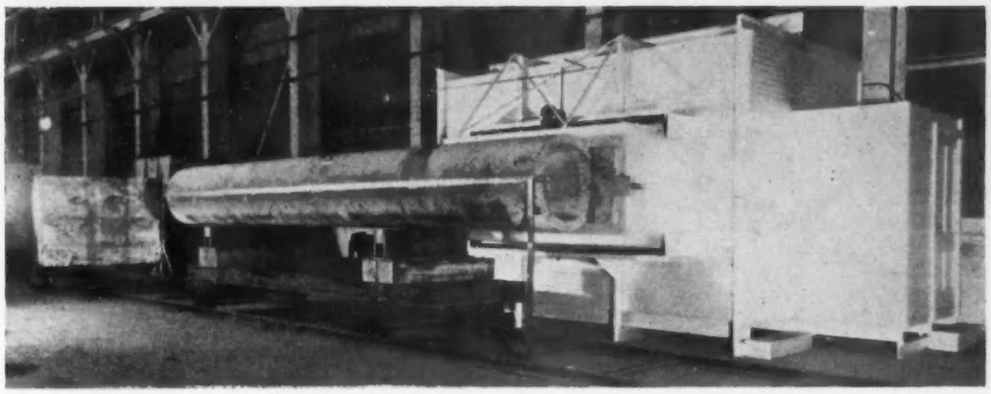


FIG. 3.—This view of the 300,000-volt X-ray installation shows the lead-lined safety box on the front wall of transformer house, and the control booth on the right of the power plant room. The boiler drum set in front of the apparatus, one of seven drums for a mercury boiler installation, has a wall thickness of 4⅛ in., is 26 ft. long and is 30 in. in inside diameter.

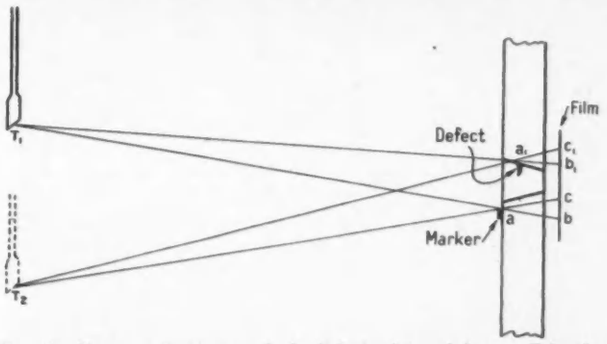


Fig. 6.—Diagram showing method of determining defects. Triangles abc and $a_1\ b_1\ c_1$ are practically similar, bc and $b_1\ c_1$ are measured on the film. Hence distance of defect from film is $a_1\ b_1 = \frac{b_1\ c_1}{bc} \times ab$.

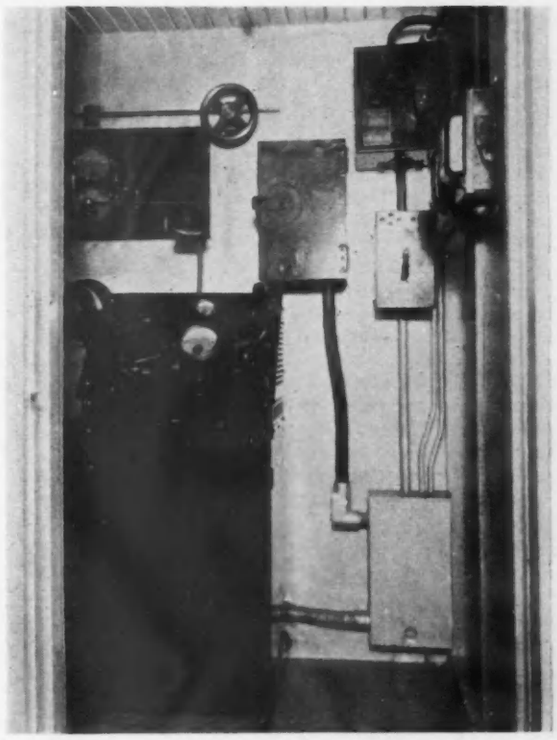


FIG. 4 (at right).—Interior of lead-lined control booth of 300,000-volt equipment.

of the section being examined, and the photographic film is placed close to the opposite side of the section. The intensity of radiation reaching the film is dependent upon the thickness of the metal being penetrated. If gas holes, slag pockets, cracks, or other defects, which locally decrease the thickness of metals, are present, a greater intensity of radiation reaches the film at these points, and a dark image of the defect appears. With proper technique, a differentiation in density may be obtained on the film that will record defects equal in thickness to only 2 per cent of the total thickness of the metal, and with thin sections, those less than 1 in. in thickness, will record defects only 1 per cent of the metal thickness. For routine examination, a sensitivity of 2 per cent of the total thickness is considered satisfactory and is required by the A.S.M.E. code covering the examination of welded pressure vessels.

This sensitivity is checked in routine examination by placing along the weld, on the side toward the source of radiation, steel strips of a thickness equal to 2 per cent of the thickness of the plate being radiographed. If the image of this strip appears on the film, it indicates that any defect equal to the thickness of this gage would also be registered on the film. A new type of thickness gage recommended by the A.S.M.E. Boiler Code Committee will give a wider check on sensitivity, since several gages of varying thickness will be used.

The sketch in Fig. 1 is a diagrammatic arrangement of the source of radiation, metal section and film. It is readily evident that, since the images obtained are direct shadow projections, there will be no less distortion when the film is close to the metal section and the source of radiation remote from the metal section. The required length of exposure, however, increases directly as the square of the distance from the source of radiation to the film; hence, a practical compromise must be made between sharpness of image and time of exposure. A satisfactory image is obtained with the type of X-ray tube usually used when the ratio of $\frac{d_1}{d_2}$ in Fig. 1 is $\frac{7}{1}$ or greater.

Another factor in obtaining sharpness of image is the proper use of intensifying screens. The photographic emulsion is not so sensitive to radiations of short wave-length as it is to visible light, and the intensifying screens serve to shorten the exposure time by converting the short wave-lengths to visible light rays. The greater part of the intensity of the film, therefore, is actually produced by light from the intensifying screens, and it becomes of the greatest impor-

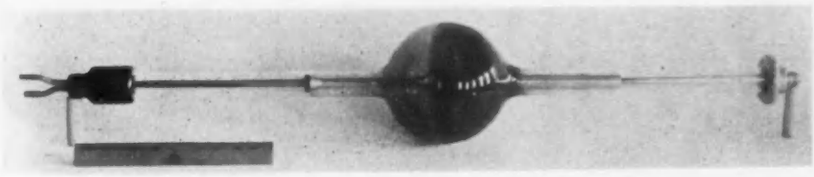


Fig. 5.—This 300,000-volt water-cooled X-ray tube is approximately 4 ft. long. The diameter of the bulb is 8 in., and of the focal spot, ⅝ in.

tance to maintain close contact between screens and film in order to obtain sharp images. This is accomplished by placing screens and film in a holder, or casette, with strong spring-clip backs to maintain tight contact.

Routine Shop Practice

X-ray testing is almost entirely used in preference to gamma rays because of greater economy, greater speed, and better contrast obtained on the film. Gamma rays are particularly applicable to the examination of sections of extreme thickness, and for use in the field where it is impossible to transport X-ray equipment.

Figs. 2 to 5 show views of shop installations of X-ray equipment for the examination of welded pressure vessels. The X-ray tubes are inclosed in lead-lined safety drums to protect workers from harmful effects of the radiations, with only a small window left open toward the weld being examined. One installation is rated for operation at 200,000 volts with 6 milliamperes of current, and the other is rated for 300,000 volts at 10 milliamperes. With these two machines, by variation of the voltage applied, it is possible to obtain excellent radiographs through steel sections up to 2½ in. in thickness in an exposure of 10 sec.; 3-in. sections require exposures of 40 sec.; 3½-in. sections require 5 min.; 4-in. sections require 15 min., and 4½-in. sections require 1 hr.

In the routine inspection of welded joints at the Barberton Works of the Babcock & Wilcox Co., 1 ft. of longitudinal weld and 9 in. of circumferential weld are examined at each exposure. The joint is marked off in these respective lengths, and lead numbers are placed at each position on the outside of the vessel. The images of these lead numbers appear upon the films; and, since the positions of the numbers are permanently indicated by punch marks on the vessel, it is possible at any time to review the character of any section of a weld by referring to the corresponding film.

Briefly, the steps involved in obtaining the radiographs are:

1.—Layout of the weld in desired lengths, and placing of lead numbers.
2.—Accurately placing the weld in front of the X-ray tube.
3.—Placement of the film inside of the vessel directly opposite the X-ray tube.
4.—Actual exposure.
5.—Movement of the X-ray tube or the vessel to the next length of weld, and replacement of film.

Development and examination of the films require about 30 min., so that, within ½ hr. after the exposures are completed, the condition of the weld has been checked. If defects appear they are located as to depth and position, and are removed by chipping with pneumatic tools. The location and the depth of defects is accomplished by a triangulation method. The defective section is exposed from two different angles using the same film. Fig. 6 shows the geometric relations and the method of calculation. This means of determining the depth of defects from the surface is accurate to within ⅛ in. with ordinary technique. After the defect has been removed and the section rewelded, the repaired area is again X-rayed to insure that the repair is satisfactory.

Slag Inclusion Is Most Common Defect

The defects which occur in welds are: slag inclusions, porosity, lack of fusion of weld metal to plate, and cracks. The most common of these are slag inclusions, which usually extend parallel to the wall of the joint. The A.S.M.E. welded pressure vessel code permits the presence of such slag inclusions if their length does not exceed one-third of the thickness of the joint, and provided that any two slag inclusions are separated by a section of solid weld metal equal to twice the plate thickness. Slag inclusions which do not meet these conditions are removed, and the section is rewelded.

Porosity is next to slag inclusions in order of occurrence. Because of the difficulty of accurately defining the amount of porosity which should be permissible, the A.S.M.E. code leaves the determination of acceptable and unacceptable amounts of porosity to be based on comparison with standard radiographs.

Cracks and sharp lines of lack of fusion are not common; but, when they occur, they are completely re-

Fig. 7.—Radiograph of perfectly sound weld in 1-in. thick plate. Excess weld metal has not been removed.

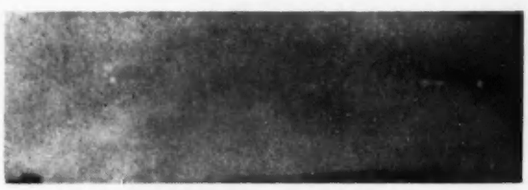


Fig. 8.—Small slag spots are shown in this ¾-in. thick weld. The weld would be acceptable under the A. S. M. E. code if the spots were separated from each other by twice the thickness of the plate. But in being close together, the spots must be removed.

Fig. 9.—Weld 1-in. thick with unacceptable slag inclusions.

Fig. 10.—Radiograph showing fine porosity throughout entire weld, which is 1½-in. thick. This weld would be acceptable to A. S. M. E. code and would be found to have excellent physical properties.

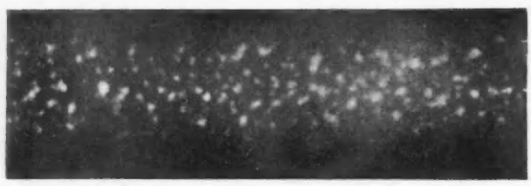


Fig. 11.—Weld 1½-in. thick, with large amount of porosity. The strength of this weld probably would not meet code specifications.

Fig. 12.—Radiograph of 1-in. thick weld, showing sharp line of lack of fusion at the root of the weld.

Fig. 13.—Cracks extending across the 4⅛-in. thick weld are shown in this radiograph.

Fig. 14.—Radiograph of 1½-in. thick weld with intermittent slag inclusions.

Fig. 15.—Double exposure for determining depth of defect shown in radiograph Fig. 14. The displacements of the images of the defects and of the lead markers are measured on the film. A single calculation involving the ratio of these displacements gives the distance of the defect from the surface of the weld.

Fig. 16.—Radiograph of same spot as in Fig. 14 after the defect was removed and the area rewelded.

moved regardless of how small they may be. Radiographs showing the various defects listed above are shown in Figs. 7 to 16 inclusive.

During the past 2½ years, approximately 21,000 ft. of welded joints in pressure vessels have been examined by the X-ray method at the Barberton plant. The thickness of these joints has ranged from less than 1 in. to 4⅛ in. The practical limit of metal thickness with present equipment is 4½ in.; but, if X-ray tubes are built to operate at higher voltages, this thickness limit may be increased to 5½ or 6 in. of steel.

The X-ray method has been applied by the Babcock & Wilcox Co. particularly to the examination of welds, and for this use it has proved to be the most satisfactory non-destructive test of welded joints. It gives positive size and location of defects, thus enabling their removal. The routine inspection checks defects against welding technique and individual welders, hence making for more careful work; and the complete, permanent film record obtained is easily interpreted and gives assurance of the quality of every part of the joint.

X-ray examination has also been applied to castings for the development of molding and casting technique, but has not been used for routine production inspection. Its value as a check on the soundness of a casting cannot be doubted; but, because of the irregular shapes and the resulting variable thickness in a single casting, the difficulty and expense make routine inspection impracticable.

Five-Year Outlook for Steel

THE probable five-year future of steel was analyzed in the *Harvard Business Review*, for January, by Robert E. Baker and Harold R. Moorhouse, of Arthur G. McKee & Co., Cleveland. They suggest that at times production in the industry may rise above 60 per cent, as measured in present capacity, but that it is unlikely that average output will exceed that figure in the next five years. Strong, well-integrated companies, they say, require operation at about 65 per cent of capacity to insure proper returns on total invested capital (bonds, capital stock and surplus), and even the best situated and best managed concern must have a 35 per cent operation to earn anything on capital after application of proper depreciation charges.

They look forward to an increase in the consumption and use of welded pipe of all sizes and for all purposes. They expect increases in the use of steel for natural gas and gasoline transport. At the present time there are 84,000 miles of natural gas trunk lines in the United States and 3510 miles of gasoline pipe lines, the longest of the latter extending 1500 miles.

To show the advantages to the steel industry accruing from water transport, or a combination of rail and water transportation, over all-rail haulage, they compiled the accompanying table of the assembly costs of raw materials.

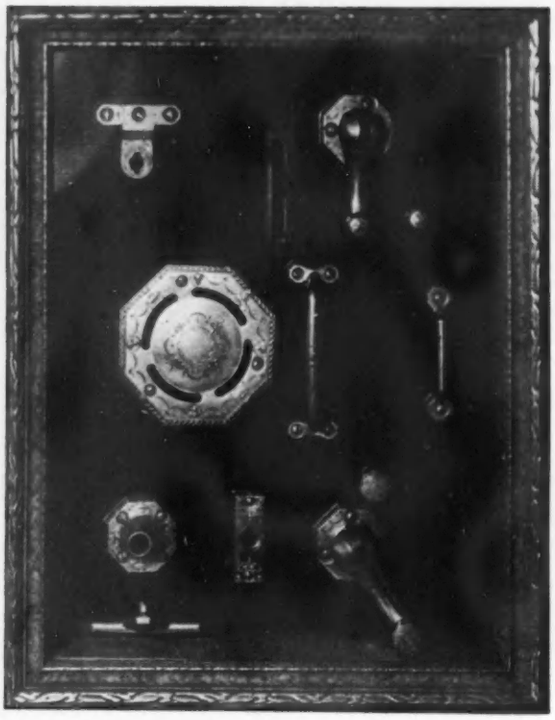
ASSEMBLY COSTS OF RAW MATERIALS

	Pig Iron Assembly Costs for Iron Ore, Limestone and Coke (Based on Use of 100 Per Cent Ore Burden of 51.5 Per Cent Natural Iron Content)		Pig Iron Assembly Costs for Iron Ore, Limestone and Coke (Based on Use of Scrap-Ore Burden)†		Steel Ingots‡ (Produced in Open-Hearth Furnaces)	
	Rail*	Rail-Water	Rail*	Rail-Water	Rail	Rail-Water
Youngstown	$7.798	$7.438	$6.66	$6.33	$3.89	$3.71
Pittsburgh	9.215	6.559	7.65	5.27	4.64	3.20
Cleveland	6.630	6.500	5.21	5.14	3.03	3.00
Buffalo	7.450	6.410	6.15	5.27	3.55	3.07
Detroit	7.910	6.450	5.22	4.18	3.04	2.45
Chicago	8.050	6.920	5.93	5.05	3.44	2.94
St. Louis	6.894	....	4.89	...	3.06	...

*All rail except for transport of iron ore by vessel to distribution or forwarding point on the Lakes.

†Amount of scrap used in burden estimated for each district according to desirability and availability of this material. Desirability and availability factors computed from the average prices of suitable scrap in the several districts for the year 1928 and 1930.

‡These assembly costs have been set up on the basis that the companies in each district use the same amount of steel scrap. This practice is not followed in actual open-hearth operation. The amount of scrap depends on the availability of this material at a lower price than for pig iron. In Detroit, for example, there is a considerable amount of scrap available at a lower price than in other steel-producing centers. Steel scrap suitable for use in producing open-hearth steel is normally about $4 per ton cheaper in Detroit than in Youngstown.



Set of automobile hardware designed and worked out in solid silver for the original Franklin automobile. Later it was reproduced in zinc by die casting

Artists and Engineers Cooperate in Production of Die Cast Hardware

By J. B. NEALEY
American Gas Association, New York

THE transition of art to industry or putting art on a production basis does not mean that the objet d'art loses any of its original beauty. It does mean that the piece of art, straight from the hands of the artist, must be faithfully reproduced by quick-acting mechanical devices. Frequently these mechanical methods are limited in their application so that the artist and engineer must work together. In this coordinated effort the limiting factors are being overcome, one at a time, and the field is broadening continuously.

This is particularly true of the automotive hardware industry, which was born within the silversmith's art but was soon transposed to the field of mechanical die casting and cheaper alloys. One of the pioneers in this field was the Devereaux Corpn., Detroit, and its predecessor the Sheppard Art Metal Co. The first set of automobile hardware was designed and worked out in solid silver by the silversmiths of the Gorham Silver Co. This was for the original Franklin car but was far too expensive; so J. B. Sheppard designed a set of corresponding dies, used them in a die casting machine and reproduced the original hardware in zinc.

From this start, automobile hardware, die cast in the softer metal alloys, came into general use throughout the automotive industry. The Devereaux Corpn. die casts hardware for practically every make of car in the country with the exception of the General Motors line. In the art department of this company artists and sculptors design sets with distinctive features to harmonize with the designs of the new car models, which are continually being submitted by the automobile manufacturers. Frequent consultations are had with the engineers who design the dies, and when a set has been approved it is

COLLECTION of miscellaneous automobile hardware designed and die cast at the Devereaux plant

modeled by the sculptors in wax or wood, and from this a brass casting is made. This is altered to suit the mechanical limitations as dictated by the engineers, and when finally approved, is sent to the die shop and corresponding dies are sunk for use in the die casting machines.

Inserts Made in Press Department

The plant of this company is made up of the following divisions: art design, tool and die design, die and machine shop, die casting, machining, plating, polishing, assembly and press room. The latter contains groups of power presses with which steel and brass parts are stamped from sheet metal, many of which are inserted in the dies of the casters and become a part of a composite die cast assembly. Both vertical and inclinable presses, ranging from 3 to 250 tons are included. All of the dies, tools, fixtures, casting machines, etc., are made in the machine shop of this plant. Dies are made from alloy steels carefully heat treated in gas-fired furnaces.

As dies have a multiplicity of impressions or cavities, ranging from one to 30, all of which must be held to exact dimensions and tolerances, a mechanical die sinking machine is employed which utilizes a finished master die as a guide for the cutting tool. After the impression has been roughed out by this machine, in a block of steel, this impression is smoothed by hand and then pressed out with a master hob under a hydraulic pressure of 1000 tons. Multiple impressions in a single block are customary here, where economical.

Use High-Strength Zinc Alloys

Zinc alloys made by the New Jersey Zinc Co. and known as the Zamak series, are for the most part used in all automobile hardware, refrigerator hardware, etc., produced here. These alloys have the highest tensile strengths of any of the commercial die casting alloys and range from 35,000 to above 50,000 lb. per sq. in.

MAKING of zinc alloy die cast automobile hardware sets at the plant of the Devereaux Corpn., Detroit, is outlined in this article. Artists design the sets to harmonize with new car models, consulting frequently with die designers. When a set has been approved, it is modeled in wax or in wood by sculptors, and a brass casting is made. The latter is altered to suit mechanical limitations as suggested by the engineers, and then sent to the die shop, for making of the dies.

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The average compositions of these alloys in addition to zinc are as follows:

Alloy	Aluminum	Copper	Magnesium
	Per Cent		
Zamak-2	4.10	2.70	0.03
Zamak-3	4.10	—	0.04
Zamak-5	4.10	1.00	0.03
Zamak-6	4.10	1.25	—

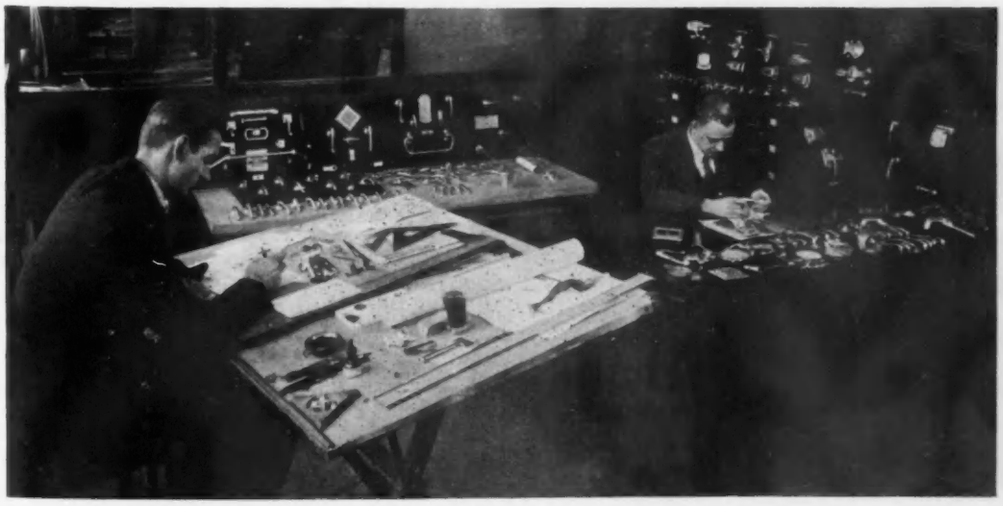
Any metal undergoes dimensional changes when heated and cooled and these alloys are no exception. While this characteristic is negligible for the most part, it is necessary to keep these changes to a minimum in certain products. Castings of these alloys undergo slight decreases in dimensions, impact strength and hardness in two stages. The first is brought about by the severe chill the casting receives when the hot metal is forced against the die walls, which sets up shrinkage strains. These strains are relieved naturally in two stages, the first occurring in from four to five weeks while the second, a phase change and practically negligible in amount, is distributed over a period of several months.

Zamak-3 was developed for special parts requiring close tolerances, clearances and delicate alinements, and embodies high dimensional stability. When it is not convenient to allow time for aging naturally, cast parts may be heat treated in gas-fired furnaces and the same effect produced in a few hours. They are heated to from 158 to 212 deg. F. for periods ranging from 3 to 12 hr. and are then either cooled in the air or in the furnace. These treatments will reduce dimensional changes to plus or minus 0.0005 in.

Die Casting Operations

In the die casting division there are two long rows of die casting machines of conventional type. Melting is accomplished in a nickel cast iron pot which sets in a gas-fired furnace of refractory material, steel incased, and the molten metal is allowed to run into a gooseneck, from which it is forced into the dies by a plunger or piston actuated by an air cylinder. The pressure at this point can be controlled up to 2700 lb. per sq. in., giving a capacity for castings ranging up to 30 lb. in weight. The two parts of the die are held in the conventional fixture, which holds one stationary while the other is movable through a short distance to allow the casting to be removed. With this type of machine, the gooseneck nozzle is permanent against the die intake port and a gas burner plays on it to keep the liquid metal from chilling at this point. The reverse stroke of the piston replenishes the metal in the gooseneck cylinder by vacuum suction through a valved port in the bottom. By taking the metal from the bottom instead of the top, the occasional drawing in of dross with the metal is entirely eliminated.

Zinc alloys are cast at temperatures ranging from 750 to 850 deg. F. as against 1350 to 1500 deg. F. for aluminum alloys and 400 to 500 deg. F. for the tin-lead base alloys. Some dies of simple design are good for a half million "shots" or more with zinc alloys. Some special alloys are made up at the plant, and for this purpose there are 1500-lb. melting pots which set in gas-fired fur-



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VIEW in the art design department. Artists and sculptors design sets with distinctive features to harmonize with the designs of new car models

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ELECTROPLATING room showing gas-fired immersion heater at left center. Metal finishes include nickel, bronze, chromium and cadmium

naces 4 ft. in diameter and 3 ft. high. These pour into cast-iron water-cooled molds held in steel frames. This entire department is served with an overhead bridge crane and chain hoist. Each die caster is provided with an indicating pyrometer with a thermocouple directly in the molten metal.

While parts formerly made from steel, iron, brass, etc., are now cast in zinc alloys, the use of inserts which make it possible to take advantage of the characteristics of other metals and materials is a feature in this plant. Stampings, forgings, screw machine products, wood fiber, pressed paper and ceramic products are used as inserts and are held tightly in place by the shrinkage of the metal around them. Many of these are made in the machine division, which is equipped with lathes, drills, tappers, millers, shapers, gate cutters, trimmers, etc., for machining castings that require it.

Wide Range of Metal Finishes

The zinc alloys will take a wide range of metal finishes through the electroplating process, as well as lacquer and enamel by dipping or spraying. Included among the metal finishes are nickel, bronze, cadmium and chromium, together with gold and silver. In fact one special set of hardware made here was plated with gold at a cost of $800. The plating room contains one entirely automatic plating machine, as well as two semi-automatic and a number of still and agitator-type plating tanks.

Washing and cleaning is accomplished in a number of steel tanks, heated by immersion burners fired with gas. Each tank contains a 4-in. steel pipe, looped back and forth on the bottom. One end of this pipe is welded into the side of the tank, which is cut out at this point, and the gas burner fires directly into it. The other end of the pipe is bent upward and rises up out of the tank to provide a flue for the exhaustion of the spent products of combustion. The gas burners are of the premix, high-pressure gas type. All are provided with automatic temperature controls of the expanding liquid, diaphragm valve type.

Tumbling and sand blasting, as well as polishing and buffing, are employed. There are long rows of double lathes operated from main shafting, each lathe being hooded and connected by duct to a long flue with a motor-operated blower fan which sucks up all dust and blows it into dust collectors located outside of the building. The final division is for assembly and here are located long benches with small machines, such as bench presses, where needed. Also, there are many gas torches for welding and soldering. Nickel plating is used as a base for soldering, for the castings lose their desirable properties when contaminated with lead-tin solders. Where welding is necessary inserts are used.

Carbureter Body Held to Close Limits

One of the particularly difficult castings made here is the carbureter body used on the Ford V-eight automobile. This casting must be held to very close tolerances, some as close as 0.0005 in. Construction of the dies on this part was very important, because of the close dimensions and the many cored holes, all of which had to be held in exact relation with each other. Also due to the irregularity of this part, the shrinkage between the sections of varying thicknesses was a very serious item, but was successfully overcome.

CORNER in die casting division showing some of the die casting machines

The Uses and Applications of Stainless Steels

By WALTER M. MITCHELL
Metallurgical Engineer, Subsidiary Companies of United States Steel Corpn.

DIVERSIFIED as the applications of stainless alloys have been, they have, nevertheless, a definite logical field of usefulness, and they cannot arbitrarily be substituted with profit for the cheaper grades of steel. Their commercial utility will therefore be based on the existence of certain demands or requirements, which experience has shown cannot be satisfied by the use of already known metals or alloys, and on those applications where the advantages gained will justify their somewhat greater cost.

These requirements may broadly be divided into two groups which are, of course, not necessarily independent, as follows:

(1) Requirements for corrosion resistance. This includes resistance to high temperature oxidation, for this is merely a form of corrosion. Under this should also be included requirements for decorative materials, since the ability to maintain an untarnished surface is merely the evidence of unusually complete resistance to corrosive attack.

(2) Requirements for unusual mechanical properties of hardness, strength, toughness, or ductility. With this should be included requirements for resistance to wear and abrasion.

The unique characteristic of all stainless alloys is their corrosion resistance. The first commercial application, for cutlery purposes, by Brearley in 1914 was a recognition of this property in the alloy of 12-14 per cent chromium and 0.35 per cent carbon. Today this composition is still in use and is standard for the highest grade cutlery, surgical instruments and the like. But because of the high selling price of this composition, it has been superseded, particularly for the cheaper grades of stainless cutlery, by a much lower carbon analysis with the same chromium content. This is readily produced in the form of cold rolled strip. Air quenching provides sufficient hardness, and blanking operations shape the blades, grinding finishes them, and affixed to suitable handles, they find ready market in the low price chain stores.

Not a Panacea

Corrosion is one of the most serious and perhaps the most costly problems confronting the chemical engineer. The stainless group of alloys are not to be considered a panacea for all corrosion troubles, but their intelligent use is certain to afford much help in dealing with many corrosive chemicals.

The outstanding example of this is in the nitric acid industry; and it was this application which, more than any other, was responsible for the rapid rise to commercial importance of these alloys. The 16-18 per cent chromium low carbon stainless steel has become standard for the ammonia oxidation process and has made it commercially practical. Today the total investment in stainless acid plants will run well into millions of dollars. As stainless alloys are particularly efficient against nitric acid and oxidizing compounds, much stainless equipment has been fabricated for digesters, etc., for nitrating in manufacture of explosives, plastics, lacquers and rayon.

Stainless in the Petroleum Industry

In the petroleum industry corrosion is perhaps the most serious problem encountered, and the use of stainless alloys has been equally worth while. Here the cost of rust and corrosion runs well over one hundred million dollars a year and is a direct tax on every user of oils and gasoline. While metals are known which possess high resistance to sulphur and its compounds, there is no metal, except chromium, which when added to steel produces an alloy so eminently suitable for the oil industry; not only because of its high resistance to corrosion attack, but also because no other metal produces an alloy equally capable of maintenance of strength at elevated temperatures.

The demands for increased yields from crude oils and for gasolines with "anti-knock" properties have necessitated the use of metals with high strength and greater corrosion resistance than given by carbon steel, and, in consequence, many thousands of tons of stainless alloys have been used in the production of still tubes, tube supports, bubble caps and trays, retort linings and for other applications.

In Pulp and Paper Making

In the pulp and paper industry the manufacture of sulphite pulp presents many problems, and corrosion is again one of the most serious. Sulphur is again the chief trouble maker. Austenitic chromium-nickel alloys of the 18-8 type have been successful in some instances, but not in all. The possibility of the presence of a small percentage of sulphuric acid in the "cooking acid" makes necessary an alloy with definitely greater resistance. In some instances the addition of some 3-4 per cent molybdenum to "18-8" gives more satisfactory results, as does the use of a higher alloy combination such as 25 chromium and 12 nickel; and there are other high chromium analyses which have been found to give good results.

Equipment manufactured from these alloys includes acid lines, relief lines, acid storage tanks, valves and fittings, blow pit bottoms, etc. While the actual construction of a full size digester of stainless alloy has not yet been attempted, the possibility of a stainless lining has been considered, and the suitability of such a material as stainless clad plates—Plykrome—for this purpose is at once apparent.

In the production of fine writing papers the stainless alloys have proved their value in the elimination of rust and corrosion products which might cause discoloration or impairment of quality. Hardenable stainless alloys are suitable for beater bars in jordans and for rods in rod mills.

More miscellaneous applications are

(*Continued on Advertising Page* 12)

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THE importance and influence of stainless steels are manifest in the widest and most diversified activities: from hypodermic needles to the ponderous reaction chambers of the oil refinery, from the mild corrosion of milk and dairy products to the strong acids of chemical industries, from watches and novelties in jewelry to decorations for the mightiest skyscrapers in the world, from the delicate construction of parts for airplanes and dirigibles to bank vaults and strong boxes. In this paper presented at the "Stainless Steel Meeting," in New York, April 26, Dr. Mitchell gives an interesting and useful account of the range of application of this material in the light of present experience.

Proper Methods to Employ in Using Tantalum Carbide Tools

PRACTICAL shop methods, as well as the characteristics and uses of tantalum carbide alloys, were discussed by C. E. Stryker, Ramet Corpn. of America, North Chicago, Ill., before a recent machine shop practice meeting sponsored by the Chicago section of the American Society of Mechanical Engineers. After reviewing briefly the characteristics of tantalum Mr. Stryker went on to say that tantalum carbide partakes of many of the characteristics of tantalum metal. It is remarkably resistant to corrosion and has a low thermal conductivity, which is of practical application because it keeps the heat of machining steel in the chip and prevents its conduction through the cutting tip into the tool shank. This keeps tools cool and permits the use of silver solder for attaching the tips, which facilitates fabrication of complex tools. The melting point of tantalum carbide, in common with most of the fifth group metals, is higher than the melting point of the metal, being above 4000 deg. C. against 2850 deg. for tantalum metal.

Machines "Sticky" Steels

The "non-wetting" characteristic of tantalum is the primary reason why Ramet (a tantalum carbide alloy as distinguished from plain tantalum carbide) is successful in machining steel. Steel, particularly the soft sticky variety, such as the S.A.E. 1000 series, has a strong tendency to adhere to the top surface of cutting tools. The chip passing over the top surface of the tool tears out particles of the tool metal and cuts a groove or "crater" just back of the cutting edge. This is not simple mechanical wear but appears to include what almost might be termed an alloying action between the steel chips and particles of the tool. This cratering progresses to the point where it weakens the tool so that the cutting edge breaks off.

Generally speaking, a tool consisting almost entirely of tantalum carbide will be found best adapted to the machining of soft sticky steels having a pronounced tendency to cause cratering. On the other hand, tools for machining cast iron and non-ferrous materials which have little tendency to cause cratering but whose action is confined largely to a straight abrasive wear have a relatively small tantalum carbide content.

Hardness and Strength

The two properties of hard carbides which are most commonly expressed in definite figures are the strength and hardness. The strength of Ramet ranges from 175,000 and 300,000 lb. per sq. in. depending on the grade. The hardness varies between 91 and 86.5 on the Rockwell "A" scale (diamond Brale penetrator and 60 kg. load), also depending on the grade.

The size of blanks depends on the nature of work to be done. In general, the thickness of Ramet tips should not be over one-quarter of the height of the tool shank except on small tools. Short, thick blanks are best for machining steel, because such tools are ground on top as well as on the front. Longer, thinner tips are commonly used for machining cast iron. The shank steel must be tough, fairly hard and free from warping. Certain steels containing chromium are not suitable because it is very difficult to braze to them. Such steels as S.A.E. 2340, Silman and Seminole have been widely used.

The process of brazing is simple. After fitting the blank to the recess in the shank, the parts should be thoroughly cleaned of oil and dirt. Ramet grades C and D are most commonly brazed with silver solder, melting at about 1325 deg. F. Brazing is usually done with the oxyacetylene torch, using a suitable flux and taking care not to overheat the blank to the point where the outer surface becomes burned.

Other grades which are often used where high tool operating temperatures are encountered, as in machining cast iron at high speeds without the use of coolants, are commonly brazed by means of copper in a hydrogen atmosphere furnace. The clean blank and shank are assembled and a suitable amount of sheet copper is placed underneath and on top of the blank. The assembled tool is then placed in the furnace and heated to the temperature at which the copper flows. No flux should be used.

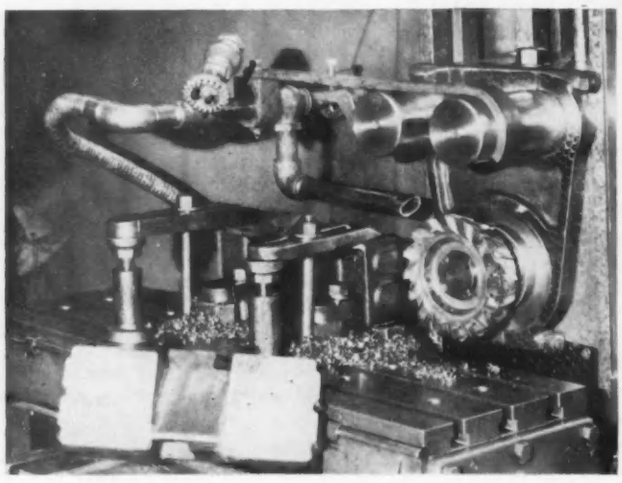
Grinding Not Difficult

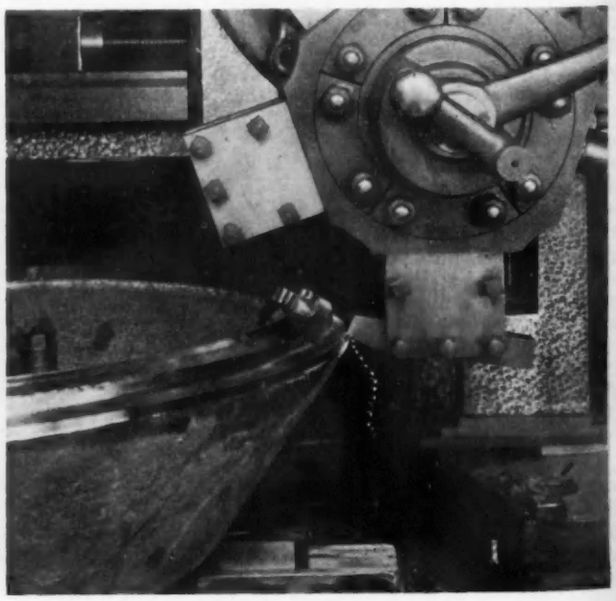
Grinding is not difficult, but it is different from the grinding of steel tools. Proper grinding wheels must be used because hard bond wheels will cause overheating and cracking and will also cut slower. Wheels of either 100 or 120 grain are most commonly used for finish grinding while 60 to 80-grain wheels may be used for roughing.

Grinding should be either all dry or all wet. In wet grinding plenty of water should be used, keeping the tool flooded all of the time. In dry grinding the hot tip of the tool should not be dipped in water. Free hand grinding is preferable because care must be taken to avoid excessive grinding wheel pressure when using a fixture or grinding on a surface grinder.

A 7-IN. insert cutter (below) operating at 108 r.p.m., 10½-in. feed, ⅛-in. depth on cast steel. Speed 200 ft. per min.

A boring mill operation (at right) on a 13 per cent manganese steel casting. This casting was completely machined in 7 hr.





Lapping is needed only where extremely fine finish is required.

Precautions in Using Hard Alloy Tools

Certain precautions which are now generally known should be observed in using hard alloy tools. The tool must be supported near the cutting edge and the overhang should be kept at a minimum. The smaller the clearance the better the support for the cutting edge and the less the tool wear. Back rake should not exceed a few degrees. Side rake may be carried as high as 16 deg. where necessary to get free cutting.

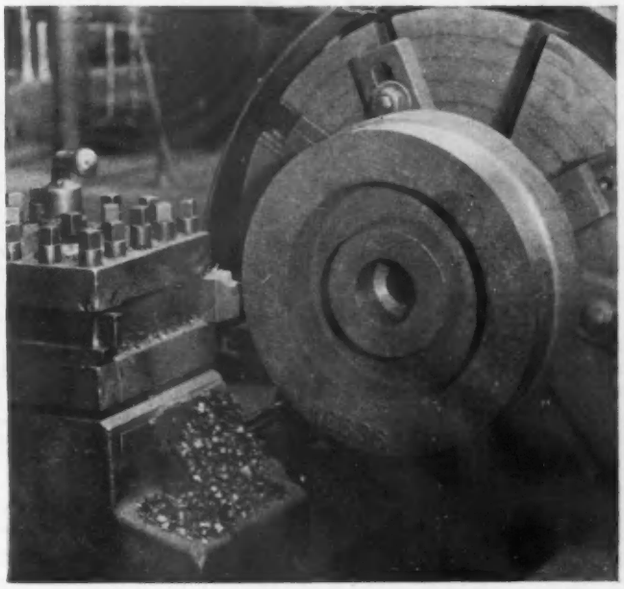
Perhaps one of the most important points in the use of these tools, particularly in the heavy turning of steel, is the undesirability of operating them at slow speeds in hogging cuts. Such operation has a tendency to cause chattering and this is very bad for any hard tool. Much better results are obtained by cutting at higher speeds, and it is not necessary to reduce the feed in proportion to the increase in speed. Generally speaking, speeds should be at least 100 ft. per min. The top limit of speed has not yet been determined, but there are many commercial jobs in which these tools are being run at speeds up to 500 ft. per min. in standard machining and considerably higher than this in so-called "diamond boring" operations.

Use in Dies

Wire, tubing and extrusion dies are made from grades which have been especially developed. Ramet, being an alloy, is free from porosity even at very high magnifications, so that it will take a very high polish. This, together with the natural characteristic of the metal, results in a relatively low coefficient of friction.

The peculiar capacity of Ramet to withstand corrosion is of particular advantage in wire dies, which are often used in connection with dips and washes having a substantial acid content. The base metals contained in this tantalum-carbide alloy are taken up in the alloy and therefore are not dissolved when the dies are immersed in acids. Such corrosive action ordinarily results in the freeing of the carbide particles if they are simply held by the base metal acting as a cement.

Technique of mounting, finishing and recutting is very similar to that followed with other carbide dies. These dies are being successfully used on steel in sizes down to 0.010 in. and on copper in sizes down to 0.030 in. They are being used on both wet and dry drawings and are also in extensive use in hot-drawing tungsten and molybdenum. Generally speaking, these dies will pay for themselves down to those sizes where diamond dies prove to be cheaper. One of the outstanding advantages of these dies is the finer finish produced on the wire, particularly where chilled iron dies have been previously used.



TURNING a cast iron flywheel. The old rate was 154 hr. per 100 pieces. The new rate is 94.9 hr. per 100 pieces

Tube-drawing mandrels afford another interesting use. Perhaps the greatest difficulty experienced with hard carbide tipped mandrels in the past has been inherent weaknesses in the method of mounting the tip on the body of the mandrel. A unique construction embodying the use of special alloys has recently been developed for Ramet-tipped mandrels, and it is believed that this construction will overcome most of the earlier difficulties.

Among special applications might be mentioned friction disks for certain types of instruments. These disks must be extremely hard and also must take a very high polish. Other applications include needle valves for handling certain liquids and gases which have a tendency to wear and corrode the tip, and tools for working tile and similar materials. The latter include scribers for marking and breaking tile and saws for cutting tile. Still another use is in knife edges and planes for balances and scales. These have been found to be not only harder but much stronger than the agate which is generally employed.

Remodeled Tata Sheet Mills Triple Production

BY remodeling its sheet mills at Jamshedpur, India, the Tata Iron & Steel Co., Ltd., is now producing more than 30 gross tons per shift of 8 hr. In fact, latest reports state that one shift on April 26 turned out 46.83 tons, and in 24 consecutive hours the production was 123.84 tons, or an average of 41.28 tons per shift, all of 36x96-in. sheets of No. 24 gage. It should be added that the standard No. 24 gage of the Tata company is somewhat lighter than the U. S. gage of the same number, weighing 0.92 lb. per sq. ft., against 1.02 lb. for the U. S. standard.

The original sheet mill, which had been in operation since December, 1924, consisted of seven double mills —seven roughing and seven finishing stands in line—driven by a 1500-hp. 250-r.p.m. induction motor through a gear reducing set. The mill was built by the United Engineering & Foundry Co.

To increase production and lower operating costs the Perin Engineering Co., New York, consulting engineer for the Tata company, recommended certain alterations and additions of mechanical equipment, and F. L. Estep, vice-president, Perin Engineering Co., with the cooperation of the plant management on the ground in India, is responsible for the plan finally adopted.

Sheet Mill Mechanized

One unit of two roughing stands and one finishing stand, with provisions for a second similar unit, were cut loose from the existing line of mills. These are now driven at approximately 2½ r.p.m. by a 2300-hp. 375 r.p.m. motor taken from another mill through a double reduction gear set built by the Mesta Machine Co. A Wean continuous double-width furnace heats the bars for the two roughing stands.

After being hand roughed in pairs in the necessary number of single and matched passes to about No. 16 gage, 1½ pairs are matched in packs of threes and transferred to the charging end of a Wean double-width continuous pack furnace. They are given one or two runover passes, doubled into a pack of sixes, returned to the charging end of the pack fur-

(*Concluded on page 758*)

Industrial Council Favored by Institute President

Colonel Lamont Opposes 30-Hr. Week Bill—Believes Employment and Wages Should be Controlled by Government Board

WASHINGTON, May 9.—Declaring that the iron and steel industry is anxious to cooperate with the Government in any sound plan to increase employment and purchasing power, Robert P. Lamont, president of the American Iron and Steel Institute, last Thursday suggested to the House Committee on Labor that he believed these ends could be achieved through a Government board or council. The council proposed would be appointed by President Roosevelt, supported by a small group of industrial leaders, also appointed by the President and working through industry as now organized. The suggestion fits in with one publicly made at the annual meeting of the Chamber of Commerce the succeeding day by Daniel C. Roper, Secretary of Commerce. Mr. Roper tentatively proposed an organization of 21 industrial leaders, appointed industrially and geographically, to be known as the President's Council of Business. The Roper plan was briefly sketched in THE IRON AGE of April 27, page 680.

Colonel Lamont made the suggestion in connection with testimony he was giving in opposition to features of the Black 30-hr. bill. Hearings came to an end last Friday and while certain phases of the measure may be enacted into legislation, the Black bill and the supplementary measure proposed by Secretary of Labor Perkins are said to have been shelved. Volumes of testimony from organized labor groups, business and industrial lines of all kinds, agricultural interests and others were presented in opposition to the rigid features of the proposed legislation. Without one single dissent, all those testifying agreed with the principle of the measures which seeks to increase employment, shorten workdays and work weeks and restore purchasing power. Time after time, however, it was maintained that as drawn the bills would have an effect opposite from their purpose.

Thirty-Hour Week Bill Would Defeat Its Purpose

Colonel Lamont pointed out that in the steel industry the proposed laws would have the following effects:

They would not noticeably increase employment or buying power, but in many cases would lead to the closing of plants and consequent unemployment.

They would increase costs and necessarily selling prices to an extent that would dry up markets, encourage imports of iron and steel and the use of substitute materials.

Colonel Lamont also pointed out that:

The steel industry has voluntarily spread work to such an extent that under present conditions employees work less, as a rule, than 30 hr. per week.

The industry generally has, over the years, reduced working hours and days more than 40 per cent without force of law.

There is no certainty of permanent unemployment; if it develops, it can be taken care of as in the past without revolutionary laws.

The committee was told that members of the steel industry would be in full sympathy with any plan that would actually give employment to more men, increase buying power, and help to get out of the depression.

Work Sharing Responsible for Steel Industry's Losses

Continuing, Colonel Lamont said:

According to a compilation by an outside statistical organization, the steel industry lost last year 161 million dollars. This is more than the total net loss reported by 1410 large corporations in 56 different industries. This rather startling situation grows out of the fact that out of a total number of industries whose statements were examined, 21 actually showed profits in 1932 aggregating 473 million dollars. The remaining industries showed losses of over 578 millions. The net loss of all reporting industries, therefore, was 105 million dollars, and—as above stated—the steel industry alone lost 161 millions.

Of this loss, it is difficult to state how much is due to the policy of the industry of spreading work over as large a number of its employees as possible, and to other social welfare expenses incurred resulting from the depression, but the total of these items runs into many millions.

Taking the industry as a whole, it is estimated that it has employed during this depression approximately two and one-half times as many men as would have been needed if the policy of spreading the work had not been adopted and almost universally carried out. In other words, 200,000 extra men have been kept at work. The effect of this program, adopted by the industry on its own initiative, has been to reduce average working hours not only far below the normal level, but actually below the 30-hr. week specified in this bill.

While the average working hours have been decreased, it must be pointed out that it has been, and would be, technically impossible to reduce certain skilled workmen and foremen to a 6-hr. day without greatly adding to the cost of production. The continuous process of manufacturing steel requires expert supervision by men who have had years of experience in dealing with molten metal. Not only would the quality of the metal be affected by a shift of men, but the cost of maintaining an extra crew would increase the selling price of steel and bankrupt many small manufacturers who are already operating at a loss.

Short Work Week Would Not Increase Employment

Colonel Lamont pointed out that a survey by the National Industrial Conference Board of 1000 manufacturing establishments employing about 1,000,000 shows that in February of this year the workers in these plants were averaging only 29.6-hr. per week, while the average in the iron and steel industry was 25-hr. It was obvious, therefore, Colonel Lamont said, that application of the bills would result in little, if any, net increase of employment in the steel industry. At some length he showed what the steel industry has done to spread employment and pointed out that it has supplied credits to employees for fuel and other supplies, deferred payments and instalments on obligations, etc. Mention also was made of the reduction in working hours and increase in wages made by the steel industry during its history. Industrial leaders, Colonel Lamont said, today believe in high wages, good working conditions, the adjustment of differences by conferences, not by strikes. He pointed to the almost complete freedom from serious and widespread labor disturbances in the past 10 years or more as ample proof of his statement.

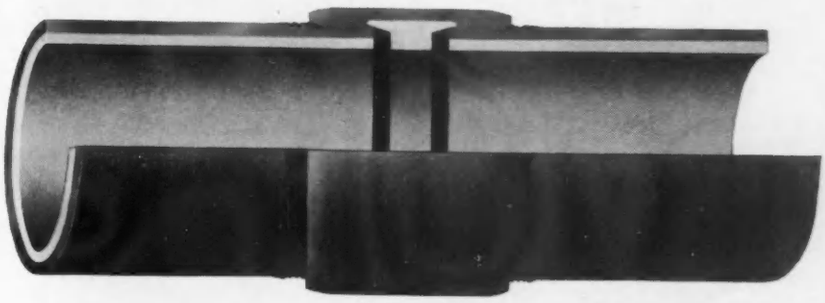
Colonel Lamont said that, in his judgment, an arbitrary limitation of hours suddenly applied to all industry, would bring one of two disastrous results: First, the actual reduction of employes' income and a lowering of the living standard, or second, an increase in costs which in the end would reduce the market for products or bring in a flood of foreign goods, both of which would result in shutdowns of factories and bring further unemployment.

Colonel Lamont favored the amendment of Chairman Connery of the committee which would apply principles of the proposed legislation to imports as well as to domestic products.

The witness said:

"In normal times the wage rates in the steel industry in the United States are from two to four times the wages paid in the steel producing countries of Europe. These low rates abroad combined with depreciated currencies have materially increased imports of iron and steel products into this country during the past two years. With the tremendous reduction in world trade, the actual tonnage has not increased but the percentage of imports has increased and, with any further advantage due to increased costs in this country, there would be great danger of a flood of foreign steel products—with corresponding reductions in operations of domestic plants, and further unemployment."

Great Lakes Steel Corpn., Detroit, has purchased eight chimney valves from Freyn Engineering Co., Chicago, for installation on hot blast stoves at its Zug Island blast furnace plant.



A SPECIAL composition (above) is provided for the threads of coupled joints and for the exposed end sections of the pipe. The couplings themselves are "Durolined."

Standard diameters of this new cement lined pipe (at right) run from ½ in. to 12 in. But larger diameters are available.

New Cement Lined Wrought Pipe Has Broad Industrial Application

NATIONAL TUBE CO., Pittsburgh, after several years of development and field testing, has placed on the market a new cement lined wrought pipe, known as National "Duroline" pipe.

The casing is produced from the same steels and by the same manufacturing methods used for regular black or galvanized wrought pipe made by this company. The lining is composed of a special cement having about one-third the solubility of ordinary Portland cement mixtures. It has the particular advantage of being suitable for hot water service as well as cold. It is resistant to the action of hot or cold sea-water which is corrosive to both ferrous and nonferrous metals. "Duroline" is also said to be unaffected by the action of many industrial liquors which ordinarily cause rapid corrosion. Due to the smoothness of the lining, it is claimed that the liquid flow under a given head is greater for this pipe than for an unlined pipe of similar diameter.

The methods employed in distributing the cement lining are of particular mechanical interest.

The lining machine, developed especially for the purpose, consists essentially of a hollow bar, somewhat longer than the pipe to be lined, and of such internal diameter as to hold, per foot of length, the exact quantity of material required to line one foot of pipe to the desired thickness. One end of this bar is closed, while the other carries a head embodying an annular orifice, suitable centering guides, and a mandrel or plug end of the proper diameter to distribute the lining around the inner surface of the pipe. The inside of the bar is fitted with a piston that may be moved back and forth throughout its length by the action of a long piston rod working through a gland in the closed end.

In operation, the pipe to be lined is pushed back over the bar head until the entire length encircles the bar, the piston is drawn back to the closed end, and the bar is pumped full of the wet "Duroline" mixture. The pipe and the piston rod are then locked together and moved forward so as to strip the pipe off the bar. For each increment of forward motion of the pipe, the piston inside the bar moves an equal distance, thereby forcing a definite amount of the lining mixture through the annular orifice of the bar head and into the pipe. As the pipe moves off the bar, the mandrel (at the extreme end of the bar) smooths the deposited cement and assists in obtaining the desired circumferential distribution. This procedure is modified somewhat in the case of the larger sizes of pipe.

Centrifugal Compacting

Immediately following the above operation, the lined pipe is placed on the rolls of a centrifugal machine and spun rapidly for a few minutes. Here the centrifugal and vibratory forces compact the lining, even up its distribution around the inside wall of the pipe, and impart to it a smooth, dense surface by an action similar to that known to cement workers as "floating."

An important feature in the manufacture of National "Duroline" pipe is the careful mill curing given the lining. This process involves moist air, steam, and hot- and cold-water treatments extending over a period of several days. These treatments promote the rapid development of high strength in the lining and further reduce the inherently low shrinkage of the "Duroline" to a point where this is no longer a factor of any importance.

Promising fields of application for this new pipe are foreseen by its makers in power plants, steel mills, sewage disposal, laundries, textile mills, paper mills, sugar refineries, etc., as well as in the fields of domestic and commercial building construction.

Gray Iron Production Higher in March

Production of gray iron castings increased slightly in March over February, according to the monthly report of the Gray Iron Institute. Both production and new business showed a marked increase over March last year. Production in March was 51.1 per cent of normal, against 50.2 per cent in February and as compared with 37.1 per cent in March a year ago. New business was 49.8 per cent as against 53.1 per cent in February and 30.4 per cent in March last year.

The greatest activity last month was in the district comprising Wisconsin, Illinois and the territory West of the Mississippi River. Production in this district was 62.2 per cent, as against 61.3 per cent in February. Production in the district including Michigan, Ohio, Indiana, Pennsylvania and the South was 47.9 per cent, as against 43.8 per cent in February. Production in New England, New York and New Jersey declined to 38.3 per cent from 50.2 per cent in February. One foundry reported the outlook good, 22 fair, 20 poor and 26 bad.

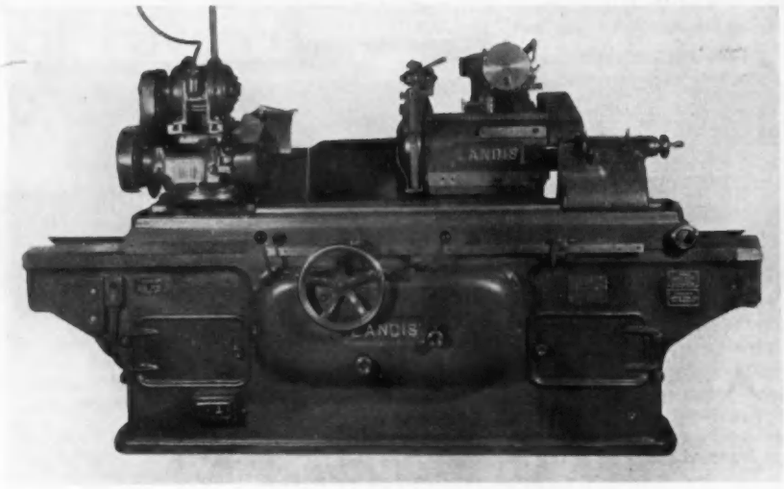
Designs Manufacturing Universal Grinder

MANUFACTURING possibilities, as well as flexibility, were primary considerations in designing the new 14-in. type C universal grinders being introduced by the Landis Tool Co., Waynesboro, Pa.

The machine has ample weight, the 14-in. x 36-in. grinder weighing, for example, 7650 lb., without motors. The increased weight has been placed where rigidity and wearing area are needed, such as in diameter of spindles, oversize swivel platens, larger slides and ways. The wheel base is heavy and the wheel spindle is large and is driven on the end by multiple V-belts. Steel back babbitt bearings are used. Lubrication of bearings is by means of filtered oil from a pump driven by the spindle itself. The double-cylinder type hydraulic table traversing mechanism employed is said to assure smooth table traverse and reversal at all speeds. The hydraulic table feeds in connection with the multi-speed headstock permit selection of speeds best suited to work.

The headstock is fully universal. It may be swiveled as much as 90 deg. for face grinding. The wheel-base may be swiveled 90 deg. each side of center and is equipped with a sub-slide so that the head may be moved forward or back as the nature of the work requires. Standard equipment includes an anti-friction-bearing internal grinding fixture, chuck for internal and face grinding, automatic hydraulic wheel-feed mechanism, center rest, and stationary and traveling cutter tooth rests. Special equipment such as rotary magnetic chucks and loose cam grinding heads can be furnished. Special hydraulically-operated tooling can be applied.

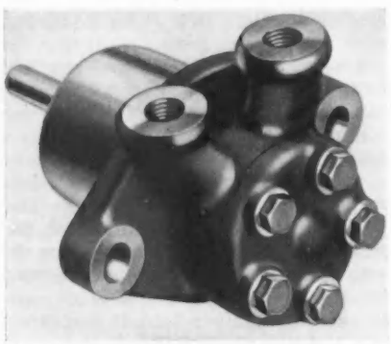
Accessibility of the various mechanisms for adjustment, inspection or repair is a feature. Removal of the large cover at the front of the bed exposes all control mechanisms and pipe connections. The wheel-spindle drive and the pump, which is mounted at the rear, are also accessible. A 5-hp. wheel-drive motor, ¾-hp. work-drive motor and 1-hp. pump motor are employed. All motors are of constant-speed type and are dynamically balanced. The new machine is built in 14-in. swing only, and in 36, 48 and 72-in. lengths.



Quantity production features are combined with the flexibility of a universal type grinder. The 14 x 36 in. machine without electric motor weighs 7650 lb.

Pump With Rotary Seal

A NEW Rota-Roll pump with either flange or foot-type mounting for oil burner or industrial installations has been placed on the market by the Sundstrand Machine Tool Co., Rockford, Ill. Rolling action of the pumping members, providing a rotary seal in place of the usual sliding seal, is a feature.



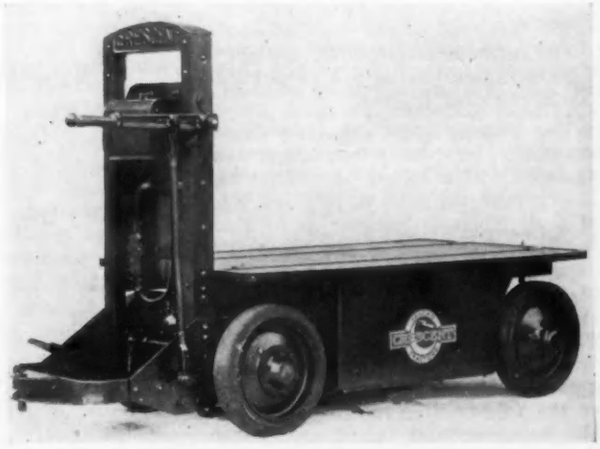
The pumping members consist of a roller and rotor which revolve in a manner similar to a roller and the outer race in a roller bearing. The two revolving members do the pumping by means of the rotary seal, the fluid being emptied ahead of the seal through the outlet port. Quiet operation, positive, uniform flow, high mechanical efficiency, and long life are claimed. The pump has capacity of 20 gal. per hr. at 100 lb. pressure and at a motor speed of 1800 r.p.m. It is driven direct at motor speeds of either 1200 or 1800 r.p.m.

Battery Truck for the Small Plant

A SELF-PROPELLING battery truck for the small plant where the loads average about 2000 lb. has been developed by the Crescent Truck Co., Lebanon, Pa.

It has a platform 33 x 58 in. and 19 in. high, an overall length of 75 in. and an overall width of 33 in. It has a turning radius of 84 in., or such that it may operate in 52-in. intersecting aisles.

The driving unit comprises a General Electric motor with worm wheel, operating in a bath of oil and mounted on ball bearings. It is equipped with a standard automatic-type differential. The drum-type controller provides for two speeds, both forward and reverse. The wheels, 15 in. in diameter, have Press-on Type rubber tires and Timken roller bearings. Complete with the battery, which comprises 12 cells of Exide 3 XH-19 plates, the truck weighs 1300 lb.



THIS Crescent truck has a platform 33 x 58 in. and is built to handle loads of about 2000 lb.

A.F.A. Offers Well Rounded Program For June 20-23 Meeting

New cast products and their application in industry, alloys for improving them, methods of castings production, and problems of the foundry industry today are subjects to be stressed at the annual convention of the American Foundrymen's Association in Chicago, June 20-23. The entire program has been prepared to give a complete picture of developments of the industry. In addition, the latest improvements in materials and equipment for castings plants will be displayed at the Foundry and Industrial Exposition, in the Exhibition Hall of the Stevens Hotel.

Prior to the official A.F.A. convention opening on Monday, June 19, there will be a conference on electric power costs, organized by a committee cooperating with the Steel Founders' Society of America, Gray Iron Institute, and Malleable Iron Research Institute. The meeting is based on a survey of power cost conditions throughout the country. This conference should be of special value to executives of foundries who are or may become users of electric melting equipment.

Following the opening convention sessions on Tuesday, June 20, will be the joint luncheon of A.F.A. and Foundry Equipment Manufacturers Association. Fred Sargent, president of the Chicago & North Western Railway, will speak on "Business and Politics."

Technical Programs for Special Sessions

Simultaneous sessions will be held Wednesday morning, June 21. The session on cast iron melting should bring out some unusually interesting information on modern methods of melting cast iron. Papers on electric and air furnace production are scheduled. A symposium on alloys in steel castings will cover the various major alloys such as molybdenum, chromium and nickel.

An interesting paper for the nonferrous metals session is on "Bearing Bronzes," by C. S. Cole of the Copper and Brass Research Association, New York, and Dr. O. E. Harder, of Battelle Memorial Institute, Columbus, Ohio. Another paper for this session describes some possible and practical uses of beryllium, a comparatively new foundry material, in copper castings.

The malleable iron meeting includes a paper on the effect of superheating on malleable annealing time. A second paper at this meeting will deal with high-strength wear-resistant malleable iron.

A nonferrous round-table luncheon conference will be held Monday noon.

On Thursday morning June 22, one of the most important steel sessions of the convention, two papers will be discussed. One, by Messrs. Briggs and Gezelius of the Naval Research Laboratory at Anacostia, D. C., will cover the results of some extensive work on the problem of hot tears in steel castings. The second paper, by Fred Grotts, of Continental Roll & Steel Foundry Co., East Chicago, Indiana, will give data on the dynamic properties of steel castings. The importance of impact testing is to be brought out.

Papers detailing various improvements in modern cast irons and their methods of production are scheduled for the cast iron session. Sea coal, slags, titanium, heat resistance, and martensitic quenching are some of the general subjects.

On Thursday afternoon a complete picture of the dust problem and its abatement will be provided at the joint foundry housekeeping conference. T. S. Hammond, Whiting Corporation, Harvey, Illinois, and president of the A.F.A., will preside.

Cast Iron Tests and Specifications

The joint A.F.A.-A.S.T.M. session on cast iron tests and specifications will be held Friday morning, June 23. This meeting on gray iron tests and specifications will be an excellent forerunner for the joint A.F.A.-A.S.T.M. symposium on cast iron the following week.

Present equipment problems of the small foundry will be stressed at the joint materials handling session of the A.F.A. and Materials Handling Division of the A.S.M.E. on Friday morning.

The final A.F.A. convention session is a conference on foundry education in engineering schools, which will take place Friday afternoon.

Throughout the four days of the convention, the Foundry and Industrial Exposition will be open from 8.30 A. M. to 5.00 P. M. in the Exhibition Hall of the Stevens Hotel. This exhibit is the first to be staged by the Association since 1931.

Post-A.F.A. Convention Sessions

Monday, June 26 (tentative)—Several important sessions to foundrymen will be sponsored jointly by the A.F.A. with the A.S.T.M. and A.S.M.E., meeting after the A.F.A. convention. One is the Symposium on Cast Iron, the third of a series on cast metals held the past two years for the purpose of providing the engineering profession with authoritative data on the properties of cast metals produced by modern methods. The symposium will stress properties available in cast iron, rather than how to produce them; in other words, what the engineer wants to know in considering the possibilities of modern cast iron for engineering work.

Tuesday, June 27 (tentative)—The joint session on foundry practice, sponsored by A.F.A. and A.S.M.E., will appeal to another group of engineers, the mechanical engineers, and will cover the application of cast irons and the place of engineering irons as efficient materials.

Shipbuilding Prospects Not Encouraging

The National Council of American Shipbuilders in its annual report for 1932 states that the immediate prospects for shipbuilding in the United States are not encouraging. Three of the four merchant vessels which were under construction at the beginning of the year were completed about April 1 and the fourth was scheduled for delivery by May 1.

The report further states that none of the naval vessels now under construction in private yards are scheduled for delivery this year, so that the present volume of naval work forms a small backlog for the immediate future.

A survey by the council discloses that about 200 major industries are involved in the manufacture of materials used in shipbuilding.

Black & Decker Note Business Improvement

Each week in April has shown a consistent and substantial increase in business, not only in the electric tool line but also in the electric motor line, according to Black & Decker.

This increase in business is not confined to the United States, but since the abandonment of the gold standard foreign business has shown a marked return to life. An improvement in collections especially from foreign countries has also been noted.

The company has recently substantially increased both the number of people employed and the hours of work at the Towson, Md., and Kent, Ohio, plants.

Jobber inventories of the company's products all over the world are at a low point and inquiries are being received regarding a probable increase in the prices of electric tools and electric motors in the near future.

These conditions are seen as the forerunners of a brisk increase in business.

The company's indebtedness to banks has been reduced during the past two years from $1,870,000 to $821,000 at the present time.

National Association of Manufacturers Developing Industry Control Program

ASSURANCE that the government will cooperate with business is said to have prompted the plan reported to have been approved by a steering committee of 25 of the National Association of Manufacturers for a wide-scale program for economic recovery through reviving production and reemploying 3,000,000 workers. Heading the steering committee is J. H. Rand, Jr., New York. Among other members are President Robert P. Lamont of the American Iron and Steel Institute and former Gov. O. Max Gardner of North Carolina.

Mr. Rand expressed the view that if industry is granted legislative permission to work out its problems through cooperation it would be the greatest step forward for industry in the last 40 years.

It is said that the Wagner or some similar bill would go a long way toward giving the desired legislation. It remains to be seen what Congress may do about it, but if it has administration support, the legislation apparently could be enacted without any great difficulty.

Some members of the committee proposing a draft of the legislation under the supervision of Senator Wagner favor a separate agency composed of a small number of men, well acquainted with the problems of industry. This agency would be charged with passing upon agreements among industries, including steel, mining, and others, concerning hours of labor, wages and prices, adjusted differently so as to be adapted to the varying operations in the different industries and localities. Besides Senator Wagner, others on the committee include Assistant Secretary of Commerce John Dickinson; Mr. Rand, David L. Podell, New York, attorney, specializing on anti-trust laws and M. C. Rorty. It is said that before the drafting of the legislation was begun members of the committee consulted the Chamber of Commerce of the United States and representatives of labor. The legislation, however, may not be whipped into final form until it has been given further study by business and labor organizations and Director of the Budget Lewis Douglas.

President Stresses Self-Regulation To U. S. Chamber of Commerce

DISCUSSIONS covering a wide scope of national and internationl problems frequently developed sharp differences of views at the annual meeting of the Chamber of Commerce of the United States in Washington last week. Frequent attacks on business for its failure to develop a planned program were made and for the most part were constructive.

The predominating view favors the self-regulation of industry. This was clearly indicated by resolutions adopted by the Chamber. This view also appears to be gaining ascendancy in the Roosevelt administration.

President Roosevelt at the annual dinner made three suggestions to industry through the Chamber. They are:

> Refrain from now on from further reductions in wages and increase wage scales "in conformity with and simultaneously with the rise of the level of commodity prices in so far as that lies within your power."
>
> Cooperate with one another to do away with unfair methods of competition.
>
> Cooperate as an integral part of the whole, rather than individual industries or units of industries.

While the Chamber took no action on the question of wages, it did adopt a resolution proposing that trade association through conference with the appropriate agency of the government should be permitted to promulgate fair rules for industrial production and distribution, to improve the status of labor, the industries of the nation, and the public welfare.

Federal regulation affording opportunity for this form of self-regulation under government supervision, the resolution declares, would produce conditions which would assure fair competitive opportunity to each enterprise and permit immediate increase in employment, raise earnings, and free the public from the burdens and detriments it inevitably suffers as a result of destructive competition on the part of the least responsible elements. All enterprise, it was held, could be held to standards of fair competition properly determined.

I. C. C. Restores Rates On Ohio Coal

WASHINGTON, May 9.—The Interstate Commerce Commission has ordered restoration of rates on bituminous coal from mines in eastern Ohio to consuming points in the northeastern section of that State. Rates are to be established on the basis of those prevailing prior to Aug. 1, 1932, when they were cut by order of the Public Utilities Commission of Ohio. Among destination points are Cleveland, Lorain, Canton, Massillon, Mansfield and Youngstown. Generally, the restored rates will mean an advance of 29c. per net ton from the affected Ohio mines, including the No. 8, Middle and Massillon districts. The rate from District No. 8 to Cleveland and Lorain again will become $1.74 as against the prevailing rate of $1.45. Surcharges are not included since the Ohio commission, again going counter to the Interstate Commerce Commission, refused to permit continuance of the surcharges. The Federal Commission is investigating this case as well as some eight other cases where States refused to permit the surcharges to remain in effect.

The restored Ohio rates, to become effective June 12, unless held up by injunction, will again mean a 10c. differential between rates from Ohio district No. 8 on the one hand and the Pittsburgh and northern West Virginia rates on the other. At present the spread is 45c. in favor of the Ohio mines, the established rate differential of 39c. being increased 6c. per ton when the Ohio commission declined to permit railroads to assess the surcharge.

Steel manufacturers in the affected district participated in the case because of the importance of the charges for hauling coal to the cost of producing and marketing iron and steel.

In finding that rates from the Pittsburgh, Freeport, Connellsville and Fairmont districts to the northeastern Ohio destinations are reasonable, the Commission excepted the measure of rates from points on the Monongahela railroad in northern West Virginia and their relation to the rates from the Pittsburgh and Connellsville districts. This point, it was stated, will be reserved for further consideration.

March Motor Car Output Gained to 118,592 Units

WASHINGTON, May 8.—The production of motor vehicles in the United States in March rose to 118,592 from 106,825 in February, according to reports received from manufacturers by the Bureau of the Census.

The Canadian production in March totaled 6632 motor vehicles, compared with 3298 in February.

OFF THE ASSEMBLY LINE

If Car Sales Continue to Climb May Assemblies Will Exceed April

DETROIT, May 8.

HAVING made approximately 170,000 cars in April, the automobile industry is now pushing on to higher levels with a possibility that assemblies will cross the 200,000 mark this month. This expansion is attributed solely to increased retail sales. Chevrolet is the best example, for its dealers' stocks of new cars actually declined about 1000 units last month, despite retail deliveries of over 54,000 cars. Retail demand is still ascending, but is believed near the peak for the year. Production programs continue to be determined from week to week, being unusually sensitive to reports from the retail trade. What is puzzling automotive executives is the trend which their business will take during the summer months, after the year's big buying admittedly is over. It is the consensus of opinion that June will show a mild seasonal drop and July will bring a more pronounced decline. However, it is believed that the tapering off will be gradual and that retail sales will hold up well enough to justify an output in July ranging from 130,000 to 140,000 cars. June production, according to present forecasts, should be close to that of April. These are only guesses at best, but they reflect the thoughts of the industry based on recent trends.

Chevrolet is adhering to a schedule calling for about 67,000 units this month, while Plymouth is at full capacity trying to make 26,000 cars. Ford is reported to be making 1700 to 2000 units daily at the Rouge plant and unless production is considerably speeded its output in May will fall far short of the 60,000 units which it originally set as its goal. Pontiac is assembling 10,000 units this month, Buick 4000 to 4500 and Oldsmobile 4000. Cadillac and Packard are working toward a total of 1000 units each. Dodge may touch 10,000 units this month for the first time in several years. Hudson-Essex, busy stocking dealers with a new 113-in. Terraplane six as well as supplying the retail demand with its regular series, is building about 5500 cars in May.

April records reveal some interesting figures. Chevrolet produced 59,953 cars, compared with 55,433 in the same month of last year. This raises Chevrolet's output for the first four months of 1933 to 208,000 units, as against 188,000 in the same period of 1932. Plymouth made 24,534 units, the second largest month in its history. Its retail deliveries amounted to 14,818 cars, compared with 9212 in March. During the four months ended April 30 sales of Chrysler-made cars totaled 61,689 units, compared with 48,549 for the similar period of last year. Graham shipments were 963 cars and Auburn's 1138. Buick sales aggregated 4786 cars; Studebaker and Rockne sold 5376 cars. For the week ended April 29, Dodge delivered to users 3504 units, the largest week since June, 1929. Early reports of registrations for April received by R. L. Polk & Co. indicate that retail sales of both passenger cars and trucks exceeded those in the same month of 1932. If this is borne out by later reports, April will be the first month since October, 1929, in which passenger car sales ran ahead of those in the same month of the previous year.

The rapid piling up of these favorable figures has meant much to the steel trade. Mills are still being pushed for rush delivery of steel to meet augmented automobile production schedules. The finishing mills of Great Lakes Steel Corpn. have been so busy that the company's six open-hearth furnaces have not been able to supply sufficient steel, the result being that sheet bars have been brought in by water from Cleveland. Water shipments of steel are now coming in to Detroit from Chicago, Cleveland and Buffalo. It is understood that steel is being sent by truck and rail from the Youngstown district to Cleveland and thence by boat to Detroit.

One northern Ohio flat-rolled steel maker is said to have shipped every pound of its automotive tonnage to southern Michigan by truck during the last year.

Parts makers are benefiting from a sizable overflow of business which motor car companies find that they cannot take care of in their own plants. This is particularly true of castings. Chrysler is farming out substantial orders for light castings, because the demand for heavy castings is taxing the facilities of its foundry. Malleable iron makers are getting a fairly good volume of orders from Ford, while jobbing foundries are feeling the effects not only from the automobile industry, but also from electric refrigerator manufacturers. Briggs, Murray and Budd are operating six days a week.

Detroit Ponders Ford Plans

The chief topic of discussion in Detroit is the possibility that the Ford Motor Co. may divest itself of some of its present properties. The story is that one of the leading steel companies is to acquire at Rouge the Ford blast furnaces, by-product coke plant, open-hearth furnaces, steel mill and possibly one other building, probably the spring and upset building. The glass plant, long idle, would become the property of a prominent glass manufacturer. Ford would move its spring and upset department or other departments to the Highland Park plant to fill space which has been vacant for some time. A considerable number of the executive offices which have been housed in the administration building on Schaefer Road have been moved into one of the buildings at the Rouge plant. This is interpreted in some quarters as meaning that the steel company which takes over the Ford steel properties will use the administration building for its offices. Although no official confirmation of this program can be obtained, the move toward decentralization of Ford production is in line with Mr. Ford's newer conception of industry. It is known, of course, that negotiations have been under way whereby Mr. Ford will divest himself of the Universal Credit Co., his car-financing agency. It is scarcely conceivable that he will transfer all of his operations back to Highland Park, as one story has intimated. The ad-

vantages at Dearborn of the delivery and dispatch of materials by water as well as Mr. Ford's vast holdings in and near that city would hardly make this story plausible. However, that he might more fully employ the facilities at Highland Park while disposing of some properties at Rouge which do not pertain directly to the manufacture of the Ford car sounds feasible.

Detroit Notes

Willy-Overland of Canada will close down its plant indefinitely about June 1. . . . Marmon Motor Car Co. is in receivership with Fred Barnickel, president Indianapolis Drop Forging Co., and Robert A. Adams, Indianapolis attorney, as receivers. This action does not affect the Marmon-Herrington Co., Inc., which makes heavy-duty trucks. . . . A Cleveland steel company has contracted with General Motors to supply a large tonnage of pig iron to the Chevrolet foundry at Saginaw. The first shipment by water has already been made. . . . Kelvinator had the biggest April in its history, turning out over 30,000 electric refrigerators, while the electric refrigeration department of the Sparks-Withington Co., Jackson, Mich., is working 24 hr. a day. The Frigidaire Corpn. is employing 10,000 men at its Moraine City, Ohio, plant, on a full-time schedule. . . . Pig iron shipments to automotive companies are running ahead of those in April . . . . Employment index of the Detroit Board of Commerce on May 1 stood at 50, compared with 41.8 on March 31 and 67.5 on May 1, 1932. . . . Industrial power consumption was 114.5, as against 81.5 on March 31 and 120 a year ago.

Used Salesmen in Market Research In Developing New Product

BUSINESS conditions now require that manufacturers develop new products that fill needs between those now satisfied by existing products without infringing on existing ones.

An example of how this problem has been solved is that of the Babcock & Wilcox Co. and its new firebrick—B. & W. "80 Junior." This product has been supplied the industrial furnace field since 1921. It is especially adaptable to furnaces operating under extremely severe conditions and has been so widely used as to reach the market saturation point. The company could obtain no apparent extension of business with it—therefore it made a market survey to determine the feasibility of developing a new product that could be handled by the existing sales organization and that would result in additional sales volume.

The survey made was unusual in that it was not conducted by the usual means of questionnaires, etc., but was made in an informal way by the salesmen while carrying on sale of the No. 80 brick. Salesmen investigated typical furnaces in various industries and analyzed requirements. From data available as to number and types of plants it was found that a market existed for a firebrick having a quality just below that of the No. 80. It also disclosed market possibilities much greater than any business for the No. 80 firebrick that could be hoped for by the usual methods of sales promotion. The company therefore proceeded with the development of the new No. 80 Junior firebrick—a quality firebrick at a price intended to justify its use in all fields except the severe conditions met only by the No. 80.

This resulting product meets the need for a refractory that covers the field in which fireclay brick are unsuitable, or are only moderately satisfactory from the standpoint of service life, and in which the No. 80 is uneconomical because of its high price, which in turn would prevent an early return on any investment made in it.

Balancing Price and Life

The new firebrick is designed to maintain a balance between price and long life so that the investment will be returned within a reasonable length of time. In any extension of a manufacturer's line of products such as this, setting the proper price of the new product is always important and under present conditions almost vital. In this case the B. & W. Co. was faced with necessity of producing a high-grade brick, out of the ordinary, in order to use its basic manufacturing process and its sales force to fullest extent. The problem therefore was to find a balance of price and quality that would have the strongest appeal to the 1933 buyer. Various combinations were studied and finally one selected that appeared to hold the greatest possibilities.

The B. & W. "80 Junior" is adapted to oil-fired furnaces, gas-fired furnaces and coal-fired furnaces where no molten slag runs down the walls. Its physical properties are as follows:

Melting point—3175 deg. F. or pyrometric cone equivalent 33.
Shrinkage—0.85 per cent after reheating at 2900 deg. F. for 5 hr.
Standard 25 lb. per sq. in. load test:
No deformation at 2660 deg. F.
10 per cent deformation at 2780 deg. F.
Spalling—18 cycles air spalling with loss of 20 per cent after standard 2900 deg. F. test.

These qualities result from the use of a blend of calcined kaolin grog and bond clays and a special treatment in an exclusive manufacturing process.

B. & W. 80 Junior firebrick have a decided brown color with white grog particles. They are extremely hard and strong and have about the same texture as B. & W. No. 80. For all practical purposes their weight is the same as that of the No 80.

Foreign Trade Council Issues Declaration

The agreement on foreign trade policy of more than 600 of the principal firms in the United States engaged in foreign trade is announced by the National Foreign Trade Council with the publication of the full text of the final declaration of the Pittsburgh National Foreign Trade Convention. The declaration is the most elaborate issued by foreign traders within recent years and its statements, particularly on the tariff, are designed to strengthen the hands of the present administration, according to the council, in the negotiations with other nations for commercial agreements that shall have sound reciprocal advantages.

Significance also attaches to the unanimous resolution of the convention, as expressed in the declaration, in favor of governmental export credit guarantees, provided that this extended credit is approved by the foreign trade community and that effective use shall be made of it.

The declaration also recommends a vigorous prosecution of all proper means to repatriate American funds frozen abroad by exchange restrictions, urges the early creation of the American Council of Foreign Bondholders to safeguard the interest of American bondholders and to promote the continuance of trade with the countries concerned, recommends that modification of inter-governmental debts be compensated by treatment guaranteeing the fair access of American goods to foreign markets, and strongly urges the retention of the Bureau of Foreign and Domestic Commerce as an effective agency of American trade promotion.

Midwest Employment Gains

Total employment in Cincinnati during April increased about 1.9 per cent over March in comparison with 12.8 per cent in Cleveland, 10.7 per cent in Canton, 7.5 per cent in Dayton and 7 per cent in Youngstown. Akron, Toledo and Columbus showed slight decreases in employment. Greatest improvement in Cincinnati employment was displayed in the construction field, while the smallest gain was made in non-manufacturing industries.

Manufacturers, particularly those making vats, bar equipment and other supplies needed in beer manufacture and sales, enjoyed the greatest increase in factory reemployment.

Gear Makers Discuss Technical and Trade Problems

E. W. MILLER

ALL departments of gear manufacture came in for discussion at the seventeenth annual meeting of the American Gear Manufacturers Association, held at the Penn Lincoln Hotel, Wilkinsburg, Pa., May 4-6.

The technical program covered papers on heat treatment, descaling, lapping, welded gears, combination motor and reducer units, worm gear tests, and the manufacture of large industrial gears; in addition, the progress reports of 12 or more of the association's technical standardization committees were discussed. The commercial standards and the uniform cost accounting committees submitted reports, and short dramatic presentations under the auspices of these committees were entertaining as well as educational. Favorable action on proposed amendments to the constitution and by-laws and the reelection of all officers were features of the business session. The meeting was outstanding for the excellence of its program and the manner in which it was arranged and conducted. E. W. Miller, chief engineer, Fellows Gear Shaper Co., Springfield, Vt., president of the association, presided at all sessions.

Broadens Membership

An important change in the constitution is the provision for professional as well as company and academic memberships, the professional membership embracing those engaged in design and application of gearing in a consulting capacity. The academic membership, provided for at the last annual meeting, includes those engaged in teaching the subject of gearing. Another amendment permits member companies to have as many representatives as they desire at all meetings. Holding of geographical or group meetings is being considered.

Officers for the coming year are: E. W. Miller, president; John Christensen, president, Cincinnati Gear Co., first vice-president; A. A. Ross, engineer, General Electric Co., West Lynn, Mass., second vice-president; and J. Harper Jackson, Pittsburgh Gear & Machine Co., treasurer. J. C. McQuiston, First National Bank Building, Wilkinsburg (Pittsburgh), is manager-secretary.

A. C. Gleason, vice-president, Gleason Works, Rochester, N. Y.; F. W. England, vice-president, Illinois Tool Works, Chicago; W. G. Jones, president, W. A. Jones Foundry & Machine Co., Chicago, and A. A. Ross were reelected to the executive committee.

Six companies were admitted to membership. They are: Ingersoll Milling Machine Co., Rockford, Ill.; National Broach & Machine Co., Detroit; National Tool Co., Cleveland; Union Twist Drill Co., Athol, Mass.; Watson-Flagg Machine Co., Paterson, N. J., and the Dominion Engineering Works, Ltd., Montreal, Canada. Executive representatives of these companies, in the order named, are: R. M. Gaylord; R. S. Drummond; O. G. Simmons; J. H. Horigan; John H. Flagg, and W. V. Muir.

New academic members are: W. H. James, Massachusetts Institute of Technology; E. O. Waters, Yale University; C. D. Albert, Cornell University; F. A. Mickle, University of Michigan; G. M. Bartlett and J. A. Sauers, Purdue University; A. W. Luce, Lehigh University; C. C. Jett, University of Kentucky, and Gerardo Immediato, Brooklyn Polytechnic Institute.

Decision on the holding of the fall meeting was postponed. The work of J. C. McQuiston, secretary-manager, and of J. H. Jackson, treasurer, during the past year was commended by E. W. Miller in his presidential address. The late Frederick N. Sinram, Ray P. Johnson, and Frank Horsburgh, for several years officers of the association, were eulogized by the president.

Operating at 22 to 26 Per Cent

The present rate of operation of the gear industry is somewhere between 22 and 26 per cent, according to E. S. Sawtelle, Tool Steel Gear & Pinion Co., Cincinnati, chairman of the commercial standards committee. In discussing the statistical work of the association, he showed a chart of gear bookings as reported by a number of members since 1928. From this chart the contributing companies are enabled to determine their relative position in the industry from month to month as compared with their position in a normal period.

In an address on "We Can't Get Business That Isn't Being Placed," Mr. Sawtelle pointed out that sales of gears are governed for the most part by general economic conditions and that they cannot be stimulated by bargain prices. Substantial attempts to increase one's business are commendable, he said, but good results do not follow trying to get new business by disregard of costs, and by going into gear lines not handled previously.

A one-act play, entitled a "Sales Bout," presented at the same session, portrayed the grief of a company whose purchasing agent secured gears solely as the basis of lowest price without regard to quality and dependability. The cast was made up of members of the association.

"Systematic Confusion in the Cost(ly) Department" was the title of another play, which followed the annual dinner. Another feature of the dinner was an entertaining but highly instructive "Hour with Science," by Dr. Phillips Thomas, Westinghouse Electric & Mfg. Co., who demonstrated the cathode ray oscilloscope, the Stoboglow stroboscope, and several combinations of photoelectric and glow grid tubes. "Electric eye" applications included counting, burglar alarms and fire extinguishing. The latter operates by light, rather than heat as in the familiar sprinkler system. George L. Markland, Jr., Philadelphia Gear Works, was toastmaster.

Technical Standards Committees Active

IN his report to the association, J. C. McQuiston, secretary-manager, pointed out that although the A.G.M.A. in its 17 years of existence had gone far with its technical program, with substantial benefit to members and non-members alike, there is still a great deal to be done. One of the projects urged was the creation of a gear handbook under the authority of the A.G.M.A. This proposal was discussed later in the meeting by M. T. Schumb, engineer, Boston Gear Works, North Quincy, Mass., chairman of the library committee, which is actively planning a bound volume comprising A.G.M.A. standards, recommended practices and data sheets. The book will include a section on gear geometry, and also the gear dictionary worked up by the association's nomenclature committee. It will be available to non-members, as well as members.

The committee presented a set of inquiry forms that tabulate the data required by the gear manufacturer

either to quote or make gears. These specification forms, intended for use by purchasers of gears, cover spur, helical, herringbone, bevel, spiral and worm gearing, respectively. They were accepted as recommended practice.

The reported programs of other subcommittees of the general standardization committee, headed by A. A. Ross, vice-president, revealed one or more active projects.

High-Test Irons for Gears

The metallurgical committee is working on high-strength cast-irons and on worm gear materials. The herringbone committee has arrived at a basis for calculation of tooth load formula and expects to make recommendations at the next meeting. Tolerances for bevel gears are being worked up by the bevel and spiral bevel gear committee. The name of the electric railway, mill and mine gear committee has been changed to electric railway gear committee. New items added to its program included material on wear gages. The nomenclature committee is working on symbols.

Among other projects, the spur gear committee, headed by Prof. Earle Buckingham, Massachusetts Institute of Technology, is conducting fatigue tests of gear materials, a long job. New testing equipment being built is expected to be in operation by summer. The horsepower formula before the association is based primarily on laboratory tests and also checked against service data; although not the last word, it was said to be closer to operating conditions than anything now available. It was suggested that members check the formula with their own practice.

A revision of the 1923 recommended practice covering the design of rawhide gears was presented by the nonmetallic gear committee. The revision refers to side plates, type 1 being standard. The number of rivets is 4 to 5 and 6 to 8. The committee is working on tolerances for non-metallic gears, principally laminated phenolic, and preferred pitches for different horsepowers.

The keyway committee presented a range of involute gear tooth spline shafts, which, it was pointed out, are replacing straight - sided multiple splines in the automotive industry. They are said to recommend themselves by having the advantage of easier measurement, shape control, lapping in of spline shafts instead of grinding, and greater strength. The committee was instructed to continue investigation of pressure angles and other elements involved, with a view to preparing a recommended practice.

Service Factors for Sprocket and Chain Load Tables

A number of projects were suggested by the sprocket and chain committee, headed by Prof. G. M. Bartlett, Purdue University. The table of allowable horsepowers and loads given in the A.G.M.A. practice of 1930 for various sizes of chains would be of increased value, it was said, if accompanied by another table of service factors. The latter would indicate the percentage by which the tabulated loads should be increased or decreased for various chain drive applications. These factors would be large or small according to whether speeds are high or low, loads steady or impulsive and on other conditions. Compilation of this table will require some research and considerable discussion. There is a strong desire to revise the present table of allowable horsepowers, said Prof. Bartlett.

Other items in the program include inverted chains, hub, bolt and bolt hole standards for type D sprockets, uniform specification blanks for use in ordinary sprockets, and a set of uniform instructions on the care of chain drives. Uniform symbols for chains and sprockets are receiving special attention at this time.

New Program of Worm Gear Tests

Because of the meager engineering data on worm gear capacities the work of the association in this direction is of major interest. A definite program of investigation of load carrying capacity of worm gearing, using the work of C. B. Hamilton, Jr., president, Hamilton Gear & Machine Co., Toronto, Canada, as a basis, has been drawn up by the A.G.M.A. worm gear committee, which is now headed by T. R. Rideout, Nuttall Works, Westinghouse Electric & Mfg. Co. The results of Mr. Hamilton's tests and studies were reported at the final session of the convention. The committee requests cooperation in time, labor, materials or in actual testing, and hopes to speed up the work materially by distributing it.

Mr. Hamilton described the results of tests of the power transmitting ability of worm gear speed reducers under a variety of operating conditions. The tests, about 600, made over a period of 11 months, embrace full load and test-to-destruction of a large number of standard high-duty worms and gears. The work has not yet gone far enough to produce a horsepower rating formula.

Relating to engineering data available on worm gear capacity it was indicated that figures from various sources are contradictory, and it was offered as a fair assumption that much of the published information is based on worms of a previous generation, both as to design and material.

Mr. Hamilton's paper was highly praised, both as to contents and the form in which the data were presented. Prof. Earle Buckingham and others discussing it urged active cooperation in the A.G.M.A. program, emphasizing the high investment value of the proposed work to companies making worm gears. Prof. Buckingham gave as the limiting factors of load carrying ability: physical strength of the driving members; surface fatigue of the material, which fatigue may be of several kinds; and heat of operation. At low speeds the limiting factor appears to be the breaking load; after a certain speed has been attained heat of operation becomes the limiting factor.

Discuss Gearmotor Problems

A paper on Gearmotors, or combined motor and speed reducer units, by R. S. Marthens, Nuttall Works of the Westinghouse Electric & Mfg. Co., was timely because of increasing manufacture and use of such units, which are designated by various names, such as Gearmotors, Moto-Gear, Moto-Reducer, geared motor reducer, motorized speed reducer, and geared head motors. The paper is confined to methods of analysis of problems which present themselves to the gear manufacturer. It deals only with parallel shaft type units and single output speeds, but many of the same analyses were said to be applicable to other types.

The first Gearmotors were built in 1923-1925. No real progress was made however until gear manufacturers realized a few years ago that the Gearmotor was the "coming unit" for power transmission at speeds lower than popular motor speeds, and actively began the present development, said Mr. Marthens. It was emphasized that the Gearmotor was a gearing development and not a motor development; there are no new motor problems involved.

The paper includes discussion of rating charts for catalog purposes, construction of the case, proper lubrication and lubrication instruction, and types of seals employed. Compactness is a major advantage of the Gearmotors as compared with separately coupled speed reducers and motors. A 15-hp. unit with an output speed of 350 r.p.m., when used with 1750-r.p.m. motor parts, for example, was said to save 38 per cent in length, 20 per cent in width, 18 per cent in height, and 55 per cent in weight. Concerning units larger than listed in present Gearmotor catalogs, Mr. Marthens said that he saw no reason for not carrying the Gearmotor type of construction into larger size units, with the same advantages of those of the smaller ones.

As there is a difference of opinion among gear makers as to the solution of some of the problems discussed in the paper, Mr. Marthens suggested appointment of a committee to determine standard practices. Such a committee will be appointed to review fundamental gearing problems involved in the design of these combined units.

Other technical papers included "Design and Manufacture of Large Gears for Industrial Service," by Thomas Holloway, United Engineering & Foundry Co., Pittsburgh. This

covered gears weighing as much as 138 tons, and was illustrated by motion pictures that showed various gear cutting operations. Included in the movies was a flying shear for cold strip that operates at 300 ft. per min. and has gear boxes designed to furnish 832 changes of speed.

Predictability and engineering freedom of welded steel gears were emphasized in an address by Everett Chapman, director of engineering, Lukenweld, Inc., Coatesville, Pa. The Bullard-Dunn process for descaling metals—what it accomplishes and how it works—as applied to the cleaning of heat treated gears was described by F. T. Taylor, Bullard Co., Bridgeport, Conn.

A comprehensive paper on the "Heat Treatment of Gearing" was presented by E. F. Davis, metallurgist, Warner Gear Co., Muncie, Ind., and an interesting outline of methods of "Gear Lapping After Heat Treatment" was given by R. S. Drummond, National Broach & Machine Co., Detroit. Further reference to these papers will be made in subsequent issues of THE IRON AGE.

To Hold Management Conferences

Conferences devoted to insurance, financial management, and general management will be held by the American Management Association, May 15 and 16, May 17 and May 18, respectively, at the Hotel Pennsylvania, New York.

The general management conference will include a paper on "Centralization *versus* Decentralization in Management for Present Conditions," by E. H. Schell, Massachusetts Institute of Technology, and a paper on "Recent Developments In Budgeting," by Arthur Lazarus, Arthur Lazarus & Co. Industrial pension systems, pricing policies, and management implications of recent social changes are topics planned.

Pittsburgh Orders Equipment

PITTSBURGH, May 8.—Local machine tool dealers are busier than they have been in more than a year, principally on new inquiry. Nevertheless, many old projects have been revived and repair parts are in considerable demand. Two gear hobbing machines have been purchased in the district in the last week.

Makers of heavy equipment for steel mills also report a satisfactory gain in orders. Roll makers are receiving many rush orders and in some cases have been called upon to make deliveries in less than a week. Mill stocks of rolls had been almost entirely exhausted and current orders are largely for immediate use rather than replacement of inventories.

... PERSONALS ...

ALDEN C. CUMMINS, who has been assistant general superintendent of the Duquesne steel works and blast furnaces, Carnegie Steel Co., Duquesne, Pa., and in charge of that plant since the death of A. L. Cromlish last June, has been made general superintendent, according to an announcement by I. LAMONT HUGHES, president of the company. Mr. Cummins was first employed by the Carnegie company in 1911 as a draftsman in the electrical department at Duquesne, following his graduation at Lehigh University. He has advanced in steel works' operations, with particular efforts toward the development and application of electricity in the steel manufacturing industry, and much credit is due to Mr. Cummins in the development and operation of a transmission system for electrical energy between the several plants of Carnegie company, and other subsidiaries of the United States Steel Corpn. in the Monongahela Valley.

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HOWARD E. JEFFRIES, treasurer of the Carnegie Steel Co., Pittsburgh, has been elected a director in the company. He entered the steel business with Carnegie Phipps & Co., Ltd., in 1887, and has followed his connection with the fiscal phases of the business in the various companies succeeding that organization. In 1920 he was appointed assistant treasurer of Carnegie Steel Co. and, upon retirement of W. C. MCCAUSLAND, in August, 1931, was elected treasurer.

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FRANK F. SLICK has been named acting general superintendent of the Edgar Thomson steel works and blast furnaces, Carnegie Steel Co., Braddock, Pa. He has been assistant general superintendent of that plant since Aug. 1, 1925, and in his new position will be in full charge, succeeding O. J. H. HARTSUFF, who has retired.

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HERBERT G. R. BENNETT has been named assistant general superintendent at Duquesne, having been transferred from the Youngstown district works of the Carnegie company, where he has been assistant superintendent of the district bar mills since 1925. He has had large and varied experience in steel and bar mill products, having first been employed by Carnegie in 1901.

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F. H. WILLCOX has resigned as vice-president and director of the Freyn Engineering Co., Chicago.

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W. J. ZUCKER has resigned as vice-president, director, general sales manager and secretary of the Stewart-Warner Corpn. He has been in the service of the corporation for 25 years. FRANK A. HITER, sales manager for the Alemite Corpn., a subsidiary of Stewart-Warner, has been named sales manager of the corporation and its subsidiaries.

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L. H. STATES, formerly connected with the Philadelphia office of the Allis-Chalmers Mfg. Co., Milwaukee, has been transferred to Syracuse, N. Y., to cover the central part of the State.

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MERRILL G. BAKER, who recently resigned as president of the Union Steel Casting Co., Pittsburgh, has been appointed executive vice-president of the Steel Founders' Society of America, Inc., New York. Colonel Baker was associated with the steel industry for many years and has had wide experience in various fields of business.

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E. L. BARTHOLOMEW, of the United Shoe Machinery Corpn., has been

A. C. CUMMINS

H. E. JEFFRIES

F. F. SLICK

made chairman of the Boston section of the American Society for Steel Treating.

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M. EDGAR YEAGER has been appointed New England district manager of stoker sales of the Patterson Foundry & Machine Co., East Liverpool, Ohio, with office at 726 Chamber of Commerce Building, Boston. He has spent more than 20 years in the stoker field in the East, having been connected with the American Engineering Co., Westinghouse Electric & Mfg. Co., and Combustion Engineering Corpn., in stoker work.

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A. A. POTTER, dean School of Engineering, Purdue University, and president, American Society of Mechanical Engineers, is making an extensive tour of visits to local sections in Wisconsin, Minnesota and Iowa, speaking on "The Engineer and Public Welfare." Among the largest audiences was that at Milwaukee on April 24, and at Beloit, Wis., on April 28, when he was the guest of the Rock River Valley section at the Fairbanks, Morse & Co. auditorium.

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W. L. CLARK, sales manager, J. I. Case Co., Racine, Wis., has been elected a vice-president of the company.

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GEORGE S. PARKER, who founded the Parker Pen Co., Janesville, Wis., in 1889, and has been its president since that time, has retired to become chairman of the board, a newly-created office. He is succeeded by his son, KENNETH S. PARKER, formerly vice-president, and in charge of research, sales and advertising since 1919.

OBITUARY

C. H. STAAT, since 1931 traffic manager with headquarters at Cleveland for Pickands, Mather & Co., and the Interlake Iron Corpn., died April 27 of heart disease. He was born in Chicago in 1888 and in 1912 started to work for Pickands, Brown & Co. He was made traffic manager for the company in 1924 and in 1928 was also made traffic manager for the By-Products Coke Corpn. In 1930 he was also made traffic manager for the Interlake Iron Corpn. and in 1931 he moved to Cleveland to assume the position he held at the time of his death.

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FRANK W. BUNN, plant manager, John A. Roebling's Sons Co., Trenton, N. J., died at the Mercer Hospital in that city, May 1, aged 68 years. He had been connected with the company for 27 years.

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WALTER C. JACOBS, president of the Central Electrotype Foundry Co., Newark, N. J., died of heart disease at his home in that city on May 8, aged 60 years.

Strip Producers Place Orders For New 4-High Mills

THE American Sheet & Tin Plate Co., Pittsburgh, the Jones & Laughlin Steel Corpn., Pittsburgh, and the Republic Steel Corpn., Youngstown, have placed orders with United Engineering & Foundry Co., Pittsburgh, for major equipment to produce light gage material in strip form for tinning. Each order includes a single stand 4-high mill, with mill stand of basic design, whereby the working rolls are driven, but embodying the newest developments in rolling mill practice. This design is expected to make possible a new high rate of production, because of the rapidity with which the heavy strips may be rolled down while cold to finished gages. The mills are expected to reduce materially the number of operations and to increase the tin plate tonnage output as compared with other types of mills.

The American Sheet & Tin Plate Co. mill will be installed in the Chicago district, the Jones & Laughlin mill at Aliquippa, Pa., and the Republic mill at Warren, Ohio. In addition to the mills, which constitute the major part of the order, United Engineering also has taken supplementary equipment required by the new installations.

At present, United Engineering at its Youngstown plant is completing for American Sheet & Tin Plate Co. what is believed to be the largest single-stand cold mill built up to this time. This is the 4-high mill of the driven work roll type, reported as on order late in 1932.

Reinforcing Steel

Awards 7865 Tons—New Projects, 2720 Tons

Staten Island, N. Y., 150 tons, reconstruction of ferry viaduct, to Igoe Brothers, Inc., Newark, N. J.

Chicago, 400 tons, grain elevator for Santa Fe Railroad, to Inland Steel Co.

State of California, 133 tons, bridges in Santa Clara and Santa Barbara counties, to various bidders.

San Francisco, 7180 tons, superstructures for San Francisco-Oakland bridge, to Columbia Steel Co.

NEW REINFORCING BAR PROJECTS

Providence, R. I., 200 tons, newspaper plant.

Wingdale, N. Y., 163 tons, water supply system, Harlem Valley State Hospital; bids this week.

Mitchel Field, N. Y., 133 tons, cold storage building; bids May 11.

Jamaica, N. Y., 128 tons, building for Krug Baking Co., Inc.

Stapleton, N. Y., 500 tons, United States Marine Hospital; project abandoned.

Cleveland, 1000 tons, Parma reservoir.

Sheboygan, Wis., 325 tons, court house. R. Sollitt, Chicago, general contractor.

Chicago, 1000 tons, Chicago Carton Co., now definitely out for figures.

Stanislaus and San Joaquin Counties, Cal., 100 tons, State highway bridge over Stanislaus River, bids May 24.

Los Angeles County, Cal., 260 tons, San Gabriel dam outlet tunnel; Concrete Engineering Co. low.

Los Angeles County, 203 tons, San Gabriel Dam No. 2, bids under advisement.

San Francisco, 1900 tons, West Bay substructure on San Francisco-Oakland bridge; general contract to Transbay Construction Co.

San Francisco, 1350 tons, San Francisco anchorage on San Francisco-Oakland bridge; general contract to Healy-Tibbets Construction Co.

San Francisco, 1640 tons, East Bay substructure on San Francisco-Oakland bridge; general contract to Bridge Builders, Inc.

San Francisco, 2200 tons, Yerba Buena Island crossing on San Francisco-Oakland bridge; general contract to Clinton Construction Co.

Pearl Harbor, T. H., 2000-3000 tons, pier and quay walls; R. E. Woolley low bidder.

Pearl Harbor, 250 tons, torpedo storage room; Tucker McClure low bidder.

Pipe Lines

Elmira Water, Light & Railway Co., Elmira, N. Y., plans steel pipe gas lines at Catherine and Wellsburg, N. Y. Cost over $40,000. Work has been ordered by Public Service Commission.

Quartermaster, Marine Corps, Washington, asks bids until May 17 for welded steel pipe (Schedule 537).

Clinton, La., has voted bonds for $45,000 for steel pipe line for natural gas supply and natural gas distributing station.

Santa Maria Gas Co., Santa Maria, Cal., plans installation of about 3000 ft. of 4-in. steel pipe for municipal natural gas supply at Arroyo Grande, Cal.

Pasadena, Cal., plans early call for bids for welded steel pipe line for water service from Pine Canyon Dam, San Gabriel Canyon, to Sunset reservoir, requiring about 95,000 ft. of 40-in. Samuel B. Morris is water superintendent.

San Francisco, 1000 tons pipe, Yerba Buena Island crossing on San Francisco-Oakland bridge; general contract to Clinton Construction Co.

Cast Iron Pipe

Springfield, Mass., will close bids May 22 on about 300 tons of 6, 8 and 12-in.

Leominster, Mass., has awarded 600 tons of class 150 to Warren Pipe & Foundry Corpn.

Holland, N. Y., is inquiring for 300 tons of 6 and 8-in.

Saratoga, N. Y., has taken bids on 200 tons of 8, 10 and 12-in.; bids will not be opened until bonds for project are sold.

State Hospital, Beacon, N. Y., has readvertised for contractor bids for laying 100 tons of pipe, which has been furnished by Warren Foundry & Pipe Corpn.

Ridgewood, N. J., has opened bids on 300 tons on which R. D. Wood & Co. are low bidders.

Wyckoff, N. J., is planning 16-in. pipe line from Cedar Hill to connect with main trunk line at Midland Park. Appropriation of $40,000 is being arranged.

Bartlesville, Okla., plans installation of 20-in. pipe line in connection with waterworks extensions to cost over $200,000.

Torrance, Cal., plans installation of 35 miles of 4 to 16-in. for water supply system. Bond issue of $400,000 is being arranged.

National Metal Trades Plans Exceptional Convention

The thirty-fifth annual convention of the National Metal Trades Association will be held at the Congress Hotel, Chicago, June 8. The annual meeting of the administrative council will be held at the same place on June 7. The convention this year is held in Chicago in order to allow the members to combine their attendance at the convention with their intention to visit the Fair.

Subjects of extreme importance to manufacturers will be made the basis of the program. The convention program as outlined now, and for which some of the speakers have already been engaged, will treat such subjects as "The Forces Behind Social Legislation," "The Farm Problem—What the Farmer Needs," "The Transportation Dilemma," "Unemployment Insurance," "Old Age Pensions," "Our Economic Outlook," "Our Financial Structure," and "Progress and Prosperity."

"There never was a time," says Secretary J. E. Nyhan, "when a convention of this sort could mean as much to manufacturers of metal products; and there never was a time when manufacturers needed to more thoroughly harmonize their thought and actions. For these reasons we feel that the forthcoming convention should prove to be exceptional."

Further and more complete announcements will be forthcoming as soon as the program is ready.

Jacob D. Cox, president, Cleveland Twist Drill Co., Cleveland; Alexander Sellers, William Sellers & Co., Philadelphia, and Charles Strawbridge, Goodman Mfg. Co., Chicago, have been nominated for reelection as president, first vice-president and second vice-president, respectively. John W. O'Leary, of Arthur J. O'Leary & Son Co., Chicago, has been nominated for reelection as treasurer.

H. S. Chafee, Builders Iron Foundry, Providence; Roe S. Clark, Package Machinery Co., Springfield, Mass.; Henry W. Johnson, DeLaval Steam Turbine Co., Trenton, N. J.; K. T. Keller, Chrysler Corpn., Detroit; J. R. Kinney, Kinney Mfg. Co., Boston, and A. H. Tuechter, Cincinnati Bickford Tool Co., Cincinnati, have been nominated for election to the administrative council to serve for a period of two years.

Scrap Price Rise Due to Natural Causes, Not Inflation, Says Institute

THE rise in scrap prices, averaging from 50 to 75 per cent, during the last six weeks is not due to the influence of inflation, but is a logical and natural reaction and correction of the technical position of scrap, it was stated by Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel, at a meeting of the national board of directors in Cleveland on May 3. Mr. Schwartz predicted further increases in scrap prices, in accordance with the law of supply and demand, in view of an apparent shortage of prepared scrap. He stated that on the basis of figures available there is only enough prepared scrap in dealers' yards, throughout the United States, sufficient for a six weeks' supply at the present rate of steel operations.

The apparent shortage was caused, in his opinion, by several factors: first, the export of approximately 400,000 tons of scrap during the last two years, most of which should have been available for Pittsburgh and eastern Pennsylvania mills, depleted the available supply in dealers' yards; second, the price of scrap had been permitted to go to unreasonably low levels, with the result that the collection machinery, during the past two years, had ceased to function, adding comparatively little scrap to dealers' stocks, either from country or industrial sources, which had reached a low point of production; third, the mills have been compelled as the result of their cash position to dig into their own piles of scrap, and many dealers, in order to meet their obligations, have been compelled to deplete their stocks by making distress sales. The apparent temporary shortage will be corrected, both by virtue of an increase in industrial activity, and by the increasing scrap prices, which will revive the collection machinery of the scrap iron industry.

The board of directors of the Institute made the following decisions:

1. A Legislative Committee, to be headed by Phil W. Frieder, of Youngstown, was appointed to prepare a program for the stabilization of the scrap iron industry, in anticipation of the passage of a bill by the Roosevelt Administration, giving wide powers to trade associations.

2. A special committee was appointed to promptly confer with the officials of certain railroads, with reference to alleged secret scrap deals, for the sale of scrap, in which the dealers were not given a public opportunity to bid. It is reported that these conferences are preliminary to action to be taken by the Institute at Washington.

3. The director general was authorized to appear before the Interstate Commerce Commission, in connection with the hearings on freight rates, to present the case of the scrap iron industry for lower freight rates.

4. The Board authorized the officers of the Institute to drop from the rolls all delinquent members who are not paid up by June 1.

5. The Board decided to hold the fifth annual convention of the Institute in Chicago during the week of July 3.

Large R. F. C. Loans for Bridges Authorized

WASHINGTON, May 9.—Approximately 283,000 tons of steel will be required for seven self-liquidating bridge projects which have been approved by the Reconstruction Finance Corporation. They represent total loans of $83,100,000. Harvey Couch, director, who is sponsor for self-liquidating loans of the R. F. C., reported that approximately 20,000 men will be given employment on these seven projects.

The main span will be the bridge to link San Francisco with Oakland, which will be four and one-half miles long, with double deck, and will cost about $70,000,000. The second largest bridge to meet approval was the combined highway and railroad bridge across the Mississippi River near New Orleans, requiring about 60,000 tons of structural steel.

Other bridges to be constructed on R. F. C. loans include a proposed bridge across the Hudson River at Catskill; a bridge at Tampa., Fla.; one across the James River at Richmond, Va.; another across the Missouri at Kansas City and two bridges across the east branch of the Niagara River.

Work will begin soon on the 271 miles of transmission lines, which will connect Los Angeles and other Southern California cities with Hoover Dam. Building of the power lines has been assured by the recent R. F. C. loan of $22,800,000 to the Department of Water and Power of Los Angeles. The contracts for machinery, equipment and material with manufacturers in States other than California will total $20,000,000. Of this sum, a total of $14,000,000 will be awarded for construction of the transmission lines. Among estimated requirements of finished materials are: copper transmission conductor, 13,400 tons; copper steel ground wire, 1090 tons, and structural steel, 28,000 tons.

United States Engineer Office, St. Louis, will ask bids about May 17 for construction of two-A-frame steel derrick boats, 45 ft. long, 20 ft. wide and 4 ft. deep, equipped with hoisting engines and accessories.

April Steel Ingot Output Up 50 Per Cent

STEEL ingot output in April was at a daily average of 53,392 gross tons, as compared with the daily average for March of 33,006 tons. Production of open-hearth ingots for April, according to the American Iron and Steel Institute, was 1,180,893 gross tons. Bessemer production was 135,217 tons.

While comparisons with March are misleading, because of the curtailment due to the bank holidays, the substantial increase in last month's ingot production may be gaged by comparing the Institute's computed operation rate of 24.56 per cent for that month with 17.85 per cent for January and 20.40 per cent for February of this year.

Comparison with 1932 shows that 144,730 more tons of open-hearth ingots were produced in April, 1933, than in April, 1932. Bessemer tonnage however was 8980 tons less than in 1932.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Gross Tons)

Reported for 1932 by Companies Which Made 95.68 Per Cent of 1932 Ingot Output

1932	Open-Hearth	Bessemer	Calculated Output All Companies Monthly	Calculated Output All Companies Daily	No. of Working Days	Per Cent Operation
January	1,230,907	160,633	1,454,309	55,935	26	25.86
February	1,230,970	157,067	1,450,648	58,026	25	26.83
March	1,149,193	193,944	1,403,723	51,990	27	24.04
April	1,036,163	144,197	1,233,603	47,446	26	21.94
May	950,838	103,593	1,101,994	42,384	26	19.60
June	755,068	100,249	893,899	34,381	26	15.90
July	653,039	102,916	790,055	31,602	25	14.61
August	696,122	97,323	829,236	30,712	27	14.20
September	804,470	124,970	971,365	37,360	26	17.28
October	885,773	132,876	1,064,598	40,946	26	18.93
November	838,419	128,844	1,010,894	38,881	26	17.98
December	724,917	81,932	843,244	32,432	26	15.00
Total	10,955,879	1,528,544	13,047,568	41,819	312	19.34

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Gross Tons)

Reported for 1933 by Companies Which Made 98.60 Per Cent of 1932 Ingot Output

1933	Open-Hearth	Bessemer	Calculated Output All Companies Monthly	Calculated Output All Companies Daily	No. of Working Days	Per Cent Operation
January	885,743	109,000	1,008,867	38,803	26	17.85
February	922,806	126,781	1,064,490	44,354	24	20.40
March	784,168	94,509	891,153	33,006	27	15.18
April	1,180,893	135,217	1,334,797	53,392	25	24.56
Four Months...	3,773,610	465,507	4,299,307	42,150	102	19.39

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.

All monthly production figures except for April, 1933, are revised. All calculated outputs and operating percentages except for April, 1933, are adjusted.

Remodeled Tata Sheet Mills Triple Production

(*Concluded from Page* 745)

nace and, after being heated, given the necessary finishing passes.

The finishing stand is equipped with a set of Wean automatic feeder and catcher tables. The finished hot rolled sheets pass from the catcher table over a short conveyor to a cooling conveyor and to the squaring shears, and from there to other operations, such as annealing, pickling, galvanizing, corrugating, etc., as required. All movements of material—furnace charging, from furnaces to mills, from rougher to the pack furnace charging end, return of packs from doubler to pack furnace—are automatic over gravity or driven conveyors, and handling is reduced to a minimum.

The intention was to concentrate on the new unit the rolling of No. 24 gage sheets, 36 in. wide and 8 or 10 ft. long for corrugating, this being the product for which there is the greatest demand in India.

Production More Than Tripled

The results obtained exceeded Mr. Estep's predictions. The original hot mill, seven double mills of which normally six were in operation, produced in the calendar year 1932 a total of 56,068 gross tons of black sheets in 5237 shifts of 8 hr., or an average of 10.7 tons per mill per shift. The gages ran from No. 10 to No. 24, inclusive, with a weighted average of No. 20. Three of the mills, which rolled almost exclusively No. 24 gage, averaged close to 10 tons.

The expenditures for the remodeling of the sheet mill unit had been authorized upon Mr. Estep's statement that, if his recommendations were followed, he expected an average production of 30 tons per mill per shift on the new unit. After three weeks of regular operation, with all the miscellaneous adjustments invariably to be made on a new installation and with a crew consisting almost exclusively of native Indians, the new unit produced during the week ended March 25 in 16 shifts an average of 30.175 gross tons per shift, with one shift rolling 40.946 tons, all 36 x 96-in. No. 24 gage sheets, except for the necessary heavier gages for warming up new rolls Mondays and Thursdays. The latest performance was referred to at the beginning of this article.

Sheet Prices Advanced on Pacific Coast

SAN FRANCISCO, May 8.—Pacific Coast mill prices on sheets have followed the rise in the East. The c.i.f. base price per lb. on No. 10 hot-rolled annealed is now 2.125c. and on No. 24 the price is 2.75c., which are $2 a ton increases. Heavy cold-rolled sheets have been advanced $3 a ton to 2.70c. No. 24 gage galvanized sheets are now listed at 3.35c., an increase of $2 a ton. Plates remain exceptionally weak at 2c. The warehouse price on all common nails is now $2.40, base per keg at San Francisco, while Seattle quotes $2.50. A general feeling exists in the trade that steel prices in general will be increased shortly. Advances on pig iron in the East make higher quotations on cast iron pipe a possibility on the coast.

Activity in construction steel during the past week has been confined mainly to small projects. New inquiries called for only 2196 tons of structural steel, 300 tons of reinforcing bars and 4125 tons of plates. Excluding the San Francisco-Oakland bridge, for which general contracts were awarded last week, steel awards consisted of 133 tons of reinforcing bars and 4400 tons of plates. Most noticeable was the absence of activity in cast iron pipe.

At Los Angeles, plans have been completed for three bridges on Ramona Boulevard requiring 279 tons of structural steel and for the Soto Street bridge over the Pacific Electric Railway tracks calling for 500 tons. A crossing over the Santa Fe tracks at San Bernardino, Cal., calls for 800 tons of structural steel.

SUMMARY OF THE WEEK'S BUSINESS

Steel Production Continues to Gain As Demand Broadens and Prices Rise

Ingot Rate Now 31 Per Cent of Capacity—Further Advances in Pig Iron and Scrap, With General Mark-Up of Finished Steel in Prospect

THE upward sweep of production, prices and purchases in the iron and steel industry has not yet been checked. While gains in steel output have not been so general as in recent weeks, and an actual recession is reported in the South, further increases have taken place in the Valleys and at Buffalo, Chicago and Pittsburgh, raising the national average to 31 per cent from 29 per cent a week ago. Growing price strength is manifest in additional advances in scrap and pig iron and in the prospect of a general upward revision of quotations on finished steel products for third quarter. Buying, stimulated by rising prices, is coming from an ever-widening circle of consumers. Many users who have not been in the market for a year or more are hastening to place orders. A tightening of deliveries on certain products, especially those consumed by the automobile industry, is probably as important a factor as prospective price increases in influencing buyers to replenish their depleted inventories.

The extent that steel consumption is keeping pace with output is difficult to measure. Steel sold to the motor car makers is obviously going into almost immediate use. Mills are being pushed to rush deliveries to meet augmented automobile production schedules, and these promise to bring May output up to 200,000 cars as compared with 170,000 in April. A Detroit district steel company, which has been running at capacity, has been forced to buy additional semi-finished steel from outside sources.

ALTHOUGH the automotive industry is apprehensive of a summer recession in demand, this fear is tempered by the knowledge that the forces set in motion by the sharp spurt in motor car demand are far-reaching in their effects. Increased employment in steel mills, foundries and rubber plants and gains in traffic on the railroads, waterways and highways are building up buying power and restoring confidence throughout the Central West. Whether for these or related reasons, a steadily increasing number of miscellaneous outlets for steel have become active. Among them are producers of washing machines, metal sinks, beer bottle cases, kitchen utensils, refrigerators and stoves. Indicative of this broadening of consumption is the fact that sheet mill output going to the automobile industry is declining in percentage, although still increasing in quantity.

THE fact nevertheless remains that the steel industry is still getting its main support from consumers of the lighter products. Building remains quiescent, and seems unlikely to count for a great deal until the Administration's public works program gets under way. Fabricated structural steel awards for the week total only 4700 tons. Railroad buying, heretofore at a minimum, shows signs of picking up. The Pennsylvania has contracted for 20,000 to 25,000 tons of rails and the New York Central will soon place 12,000 tons. A purchase of 225 tons of plates by the Pere Marquette for car repairs may be the forerunner of many orders for similar work by other roads.

It is well known that much deferred repair work has accumulated during the depression, and this is true not only of the carriers but of industry in general. Even now manufacturers of refractories are being pressed to fill orders from steel producers who were unprepared for the recent upturn in business and are hastening to rehabilitate their furnace equipment. Several mill contracts just placed by Western companies to modernize their tin plate producing facilities are significant of the change in point of view that has come about in the brief period of a few weeks.

Aside from the growing importance of rehabilitation and modernization, a number of heretofore dormant industries, among them road machinery builders and farm equipment makers, are beginning to take an interest in their possible steel requirements. Agricultural machinery makers have been particularly encouraged by a recent upturn in the movement of finished stocks out of their warehouses.

ADVANCES in heavy melting steel at Pittsburgh, Chicago and Philadelphia have raised THE IRON AGE scrap composite from $9.42 to $9.83 a gross ton. Scrap prices have risen throughout the country during the past week and the upward trend has not yet lost momentum, except possibly in the Cleveland district. The advance may be checked by higher pig iron production or by increased offerings of old material. particularly when prices justify the gathering and shipment of country scrap.

An increase of $1 a ton on eastern Pennsylvania pig iron and an advance on Buffalo iron for Eastern shipment have raised THE IRON AGE composite price for pig iron from $14.10 to $14.33 a gross ton, the highest average since April, 1932. An advance of 50c. a ton on Chicago iron is imminent.

THE IRON AGE composite price for finished steel is unchanged at 1.867c. a lb.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	May 9, 1933	May 2, 1933	Apr. 11, 1933	May 10, 1932
No. 2 fdy., Philadelphia	**$15.34**	$14.34	$14.34	$14.84
No. 2, Valley furnace	14.50	14.50	14.50	15.00
No. 2 Southern, Cin'ti	15.82	15.82	13.82	13.82
No. 2, Birmingham	12.00	12.00	11.00	11.00
No. 2 foundry, Chicago*	15.50	15.50	15.50	16.00
Basic, del'd eastern Pa.	**15.09**	14.09	14.09	16.00
Basic, Valley furnace	14.00	14.00	13.50	14.50
Valley Bessemer, del'd P'gh.	16.89	16.89	16.89	17.39
Malleable, Chicago*	15.50	15.50	15.50	16.00
Malleable, Valley	14.50	14.50	14.50	15.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	68.00	68.00	68.00	75.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	27.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	27.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	1.50	1.50	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.598	1.598	1.598	1.898
Structural shapes, P'gh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.00
Hot-rolled strips, Pittsburgh	1.45	1.45	1.45	1.40
Cold-rolled strips, Pittsburgh	1.80	1.80	1.80	2.00

Finished Steel

Per Lb. to Large Buyers:	May 9, 1933 Cents	May 2, 1933 Cents	Apr. 11, 1933 Cents	May 10, 1932 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.00	2.00	2.00	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.10	2.10	2.10	2.30
Sheets, galv., No. 24, P'gh	2.70	2.70	2.60	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.80	2.80	2.70	2.95
Hot-rolled sheets, No. 10, P'gh	1.40	1.40	1.40	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.50	1.50	1.50	1.65
Wire nails, Pittsburgh	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$12.25**	$11.75	$10.00	$9.75
Heavy melting steel, Phila.	**8.75**	8.25	6.75	6.50
Heavy melting steel, Ch'go	**8.50**	8.25	5.25	6.62½
Carwheels, Chicago	8.50	8.50	8.00	6.50
Carwheels, Philadelphia	9.75	9.75	8.50	9.00
No. 1 cast, Pittsburgh	**10.50**	10.00	9.00	9.25
No. 1 cast, Philadelphia	10.25	10.25	8.00	8.50
No. 1 cast, Ch'go (net ton)	8.00	8.00	6.75	6.50
No. 1 RR. wrot., Phila	10.75	10.75	7.50	8.50
No. 1 RR. wrot., Ch'go (net)	6.00	6.00	4.50	4.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$1.75	$1.75	$1.75	$2.25
Foundry coke, prompt	2.50	2.50	2.50	3.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	**6.50**	6.25	5.12½	5.50
Lake copper, New York	**6.75**	6.50	5.50	5.75
Tin (Straits), New York	**36.00**	32.50	25.50	20.65
Zinc, East St. Louis	3.75	3.75	3.10	2.50
Zinc, New York	4.12	4.12	3.47	2.87
Lead, St. Louis	**3.52½**	3.37½	3.12½	2.90
Lead, New York	**3.65**	3.50	3.25	3.00
Antimony (Asiatic), N. Y.	6.25	6.25	5.95	5.35

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
May 9, 1933	1.867c. a Lb.	$14.33 a Gross Ton	$9.83 a Gross Ton
One week ago	1.867c.	14.10	9.42
One month ago	1.879c.	13.68	7.33
One year ago	1.970c.	14.22	7.62
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1933	1.948c., Jan. 3	1.867c., Apr. 18	$14.33, May 9	$13.56, Jan. 3	$9.83, May 9	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Steel Demand Becoming More Diversified at Pittsburgh

Business Still Expanding, Although at Slower Rate Than in April—Scrap Market Continues to Advance

PITTSBURGH, May 9.—Improvement in orders for finished steel products continues in this district, although the rate of increase is possibly not so great as was the case during April. Nevertheless, demand is more diversified and the percentage of total shipments going to the automobile industry is being reduced. Movement to this source, however, is unabated and no reduction is expected this month.

Other important consuming industries are beginning to show a little activity for the first time, particularly the farm implement makers and fabricators of railroad car roofing. Structural steel awards continue very light, but inquiries have improved with a number of projects coming into the market which are to be financed by Reconstruction Finance Corporation funds. The pipe business continues very dull, and there is little demand for plates.

Steel ingot production in the Pittsburgh district has improved slightly to about 21 per cent of capacity, although most of the gains are attributable to independent producers. The leading interest is running at slightly reduced schedules in this territory, although gains have been recorded in the Youngstown district. Blast furnace activity is unchanged, one steel works stack having been added in the last week and another blown out. Steel production in the Youngstown district and nearby northern Ohio plants has again risen sharply to about 35 per cent of capacity, while output in the Wheeling district still averages at least 65 per cent.

Finishing mill schedules are a little higher on practically all products except pipe and structural shapes, a decline having been registered in the latter. Tin plate production has crossed the 55 per cent mark, and sheet mills are engaged at about 33 per cent. A gradual broadening of activity in bar mill units is reported.

Price advances on practically all finished steel products now seem likely during the month. Wire products are likely to be affected first, although increased quotations on bars, plates and shapes may be introduced in time to affect third quarter contracting. Higher askings on sheets and hot-rolled strip have been tested on a few spot orders, but shipments are generally being made at the old figures. Strength has been added to the pig iron market by a sale of basic to a non-integrated steel company at $14.50, Pittsburgh district furnace. Scrap prices continue strong, although consumer buying has been less of a factor in the last few days.

Pig Iron

Orders continue to improve slightly, but foundry consumption in the district has not gained appreciably. Makers of rolls and steel castings are running at a slightly better rate, but malleable and gray iron foundries have not benefited much from business recovery to date. Prices are holding unusually well, and a tonnage of basic was placed recently at the full quoted figure of $14.50, Pittsburgh district furnace. The price on foundry and malleable is well maintained at $15, Pittsburgh, while Bessemer continues at $15.50. Quotations in the Valleys are 50c. a ton less. Improved business in ingot molds may soon result in resumption of production by the Shenango furnace at Sharpsville, Pa.

Semi-Finished Steel

Buyers of billets, slabs and sheet bars are showing more interest in their forward requirements, but producers are unwilling to take contracts further ahead than July 1. Higher prices on sheets and strip steel would indicate an advance in semi-finished prices before the end of the quarter. The current quotation of $26, Pittsburgh or Youngstown, is well maintained. Forging billets are more active, and the price is holding at $31. The $35, Pittsburgh, price on wire rods is likely to be advanced before the end of the month.

Rails and Track Accessories

Miscellaneous specifications for track supplies are still improving, but new buying is deferred. Release of a tonnage of rails by the Pennsylvania Railroad seems likely to benefit the Pittsburgh mill in the near future. The other carriers in this territory will probably be forced to place tonnage during the current quarter if rail traffic continues to pick up.

Bars, Plates and Shapes

Miscellaneous demand for bar mill products is still the most favorable feature of the heavy hot-rolled market. Small manufacturers of varied products are releasing tonnage for the first time in many months, and many of them are anxious to place forward contracts. Alloy steel bars continue to move to the automotive industry in comparatively large volume, but reinforcing steel is still rather quiet. Seasonal activity is requiring some tonnage, but the absence of large projects is keenly felt. The same thing is true in the case of fabricated structural steel, although fabricators report an increasing movement of small tonnages for repair and rehabilitation work as well as to warehouses. The plate market is favorably influenced by increasing inquiry for river craft. A score of prospective buyers of barges are now negotiating for equipment, but no important lettings have yet been reported. A little plate tonnage is going into brewery equipment, but tankage steel for the oil industry is quiet and railroad car builders have taken no business.

An advance in the price of bars, plates and shapes before the end of the quarter now seems assured in this district. Recent weakness in plate quotations is being corrected in the Pittsburgh territory, and definite establishment of the 1.60c. price is assured.

Cold-Finished Steel Bars

Demand is growing and although automotive tonnage constitutes the bulk of current releases, improvement is noticed in the requirements of machinery makers. The price is well maintained, and an advance in hot-rolled bar quotations would be reflected immediately in the cold-finished industry.

Tubular Goods

Recent general improvement in the steel industry is yet to be reflected in a large way by the pipe market. Standard pipe is moving in gradually increased volume, but jobber requirements are handled largely on a consignment basis. Some makers of oil country goods report a gain in orders since the first of the month, but tonnage is still largely negligible. Mechanical tubing is comparatively more active than other types of tubular goods. Improved business outlook has brought to life a few line pipe projects, but negotiations in most cases are far from the letting stage. A number of feeder lines are in prospect which may come out if demand for oil and gas warrants.

Wire Products

An advance in current quotations on manufacturers' and merchants' wire products is likely to be announced in the next fortnight. Such a move is being discounted by the trade in their effort to cover forward requirements, but has not yet resulted in much heavier specifications. Jobbers are still cautious about increasing their stocks too much at this time, and most of the material they are taking is going directly to their customers. Current quotations on both manufacturers' wire and nails are strong. Wire mesh for road work is moving in slightly heavier volume but is hardly up to seasonal expectations for this time of the year.

Sheets

Orders for sheet mill products are still improving in this district, and most of the tonnage increase is ac-

counted for by consumers outside of the automotive industry. Releases from that source are unabated, and May schedules of motor car builders would indicate that no decline in this movement should make its appearance before the end of the month. Some orders from the agricultural implement industry have appeared, and car roofing manufacturers have placed tonnage for repair work. Refrigerator makers are still taking a substantial volume, and barrel and drum manufacturers are busy. Sheet orders last week with one large interest were the largest since the middle of 1931, and production for the industry as a whole this week will average 33 per cent of capacity.

Prices are well sustained, and a little spot tonnage has been taken at the advanced figures announced a fortnight ago. The higher price on galvanized material is particularly strong, but producers will quote 2.70c. only for the remainder of the quarter, with talk of a further advance on future business.

Tin Plate

Specifications are well sustained, and production has increased slightly over the 55 per cent rate which prevailed last week. At least two large producers are fully engaged, and the leading interest is running at close to 50 per cent of capacity. Talk has been heard of an advance in tin plate prices for the second half, but the fact that larger consumers are all under contract for the remainder of the year would allow for little change in billing prices.

Strip Steel

Improvement continues particularly in hot-rolled strip. Orders for cold-rolled are less numerous, and the continued weakness in price is probably delaying the placing of some tonnage. Hot-rolled strip production is holding at about 30 per cent of capacity, with cold-rolled slightly lower. The new price of 1.55c., Pittsburgh, on hot-rolled material has been tested on a few spot orders, but tonnage on contract is naturally moving at a lower figure. Cold-rolled strip continues to be quotable at a wide range.

Coal and Coke

The market is still rather quiet, although prospective blast furnace activity has given some stimulus to the market on the furnace grade. Shipments to foundries are heavier than they were last month. No definite strengthening in price has been noticed. Movement of Lake cargo coal is getting under way, and the prospect of stabilized coal prices has led some consumers to show more interest in the market.

Scrap

Scrap prices have gained further ground in this district during the last week, but the market has been less active. The heavy melting steel on the Pennsylvania Railroad list brought $12.75, but did not come into the immediate district. A sale of ordinary No. 1 heavy melting at $12 seems to be the top for this grade, but dealers are paying close to this figure to cover old orders. Under the circumstances the market is quotable at $12 to $12.50, an advance of 50c. a ton over last week. Hydraulic compressed sheets are quiet in this territory, as the movement from Michigan is almost entirely cut off. No. 2 steel has been sold into consumption at $10.75 and $11. Railroad material is generally stronger, with sales of rails at $12, while specialties have been sold at $14. Machine shop turnings continue strong, but there is no demand for the blast furnace grades. Buying of scrap by steel foundries is somewhat more active.

Steel Active, Scrap Higher at St. Louis

ST. LOUIS, May 9.—The outstanding development of the week was the entry into the pig iron market of melters of basic grades in the St. Louis industrial district. Specifications against contracts are reaching the St. Louis Gas & Coke Corpn. in increasing volume. New business in foundry grades was about equal to the preceding week. Prices remain firm.

Steel

Operations of open-hearth plants in the St. Louis industrial district were stepped up this week to about 18 per cent of capacity. Mills report brisk inquiry for plates, shapes, bars and sheets from warehouse and fabricating interests, who have become "inventory minded," and wish to protect themselves against the possibilities of higher prices.

The drop in crude petroleum to 10c. a barrel in the Southwestern fields has stimulated interest in tanks for storage, hastening the placing of pending business. One Texas contract is for 500 tons of plates, placed with the Graver Corpn., Chicago, and another is for 100 tons, awarded to the Petroleum Iron Works, Beaumont, Tex.

Bids will be opened at Kansas City, May 10, for a regional bridge, which will require 2500 tons of structural steel.

Scrap

The scrap market continues very strong, with price advances of from 50c. to $1.75 being recorded as the result of purchases and expectations of other purchases here and strength in the Chicago and Valley markets. An East Side melter has bought 20 carloads of heavy melting steel at $8. Dealers are bullish, declaring they are more eager to buy than to sell, and are moving only what they must move. The Missouri Pacific has offered a list of 100 carloads, and the St. Louis-Southwestern, 20 carloads.

Buffalo Steel Output Reaches 39 Per Cent

BUFFALO, May 9.—Pig iron demand is still in good volume, although last week's bookings fell below those of the previous week. General Electric Co. is understood to have placed an order for 900 to 1000 tons of foundry iron, and three or four inquiries totaling 2000 tons are in the market. The increase in the eastern Pennsylvania price means considerable to Buffalo, as does the uncertainty on future foreign iron transactions because of exchange. Various Buffalo prices are being quoted in the East, but $14.50 for No. 2 plain and $15 for malleable appear to be the going prices except to points near to Boston. A sale of 1200 tons of silvery was made. The furnace of the Republic Steel Corpn. which recently went into blast is now in full production. The furnace of the Tonawanda Iron Corpn. is expected to go into blast the last week in May.

Steel

The Lackawanna plant of the Bethlehem Steel Corpn. has increased the number of its active open-hearths to nine. Republic Steel Corpn. continues to operate four; and Wickwire-Spencer Corpn. one. The Seneca sheet division of Bethlehem is running at about 30 per cent. McClintic-Marshall Corpn. will fabricate 150 tons of steel plates for a deck barge for the United States lighthouse service. A rather extensive letting of highway steel and structural steel for bridges will be made in Albany May 11.

Scrap

With No. 1 heavy melting steel selling at $12.75, Pittsburgh, a market is opening up for shipment of Buffalo steel to Pittsburgh and Valley points. This makes for a base price of approximately $9 to $9.50, Buffalo. Some sales of short rails and low phosphorus are noted at $11.50. It is certain that no Buffalo dealer would sell a tonnage of No. 1 heavy melting steel today at less than $9.50.

Turbines Placed for Hoover Dam

The Bureau of Reclamation, Department of Interior, Washington, has awarded a contract to the Allis-Chalmers Mfg. Co., Milwaukee, for four 115,000 hp. turbines for Hoover Dam, at $1,087,600, factory. Governors for the turbines will be built by the Woodward Governor Co., Rockford, Ill., whose contract price is $47,029. Bids for butterfly valves for the turbines were rejected and new ones will be asked. No award as yet has been made for the two 55,000-hp. turbines for the dam, but it is expected to be announced shortly.

Chicago Steel Production Now 30 Per Cent of Capacity

Iron and Steel Demand Continues to Expand—Scrap Prices Still Rising and Pig Iron Advance Expected

CHICAGO, May 9.—Ingot output has gained two points and now stands at 30 per cent of capacity. Prospects for further improvement are good, as specifications, especially from miscellaneous consumers, continue to expand. New sales, though not materially higher than at the opening of the month, are steady and pressure for deliveries is no less severe.

It now seems likely that farm equipment manufacturers may enter the market sooner than had been expected. They are already in heavier production on auxiliary equipment and machinery is moving faster out of their warehouses. Where three weeks ago they were little interested in steel requirements they are now beginning to make calculations of probable needs.

The belated movement in wire continues to gain momentum and May sales promise to be better than those of April.

Scrap is more active and prices are moving up in the face of rather large offerings by the railroads. Tonnages coming on track are readily absorbed and distress scrap is far from being a factor in the present market. Buying of Northern pig iron is not far from a major movement, being spurred by strong possibility that prices are due for at least a 50c. a ton advance in the very near future. Southern iron prices are not well defined except that offers figuring back to less than $10 a ton, Birmingham, are being refused.

The leading steel producer has blown in a furnace at Gary and therefore is now using five blast furnaces. Taking the district as a whole, there are now eight steel mill blast furnaces blowing, one of which is operating intermittently.

Pig Iron

Consumers, convinced that a price advance of at least 50c. a ton is near at hand, are rapidly coming into the market. Shipments for May promise to be double those of April. It is necessary to go back about two years to find deliveries of comparable volume. A sizable sale of Southern iron clearly indicates that the real fixed policy as to price is that it must not figure back to Birmingham at less than $10 a ton. At present, this excludes this commodity from the immediate vicinity of Chicago.

Cast Iron Pipe

Small pick-up orders are more numerous but large tonnages are lacking. Recent R. F. C. loans are encouraging, though much of the pipe needed will not come before sellers for at least several months. The trade has been following public utilities, but without developing any orders.

Reinforcing Bars

The Santa Fe railroad has placed 400 tons of bars for replacement of a grain elevator that burned several months ago. The Sheboygan, Wis., court house will soon be placed, and dealers are now figuring on the 1000 tons for the Chicago Carton Co. plant. There is still some miscellaneous work coming from breweries. Road work is very dull. Federal aid is still being withheld and the State of Illinois is still arguing about the price for cement. Restricted road work accounts for very light shipments from mills. Prices are holding on small lots, but large tonnages show weakness, especial'y the older tonnages on which old low prices are still being observed.

Bolts, Nuts and Rivets

Demand remains light, inasmuch as most of the consumption in this district is by the railroads and farm equipment manufacturers. In the case of implement manufacturers the movement of machinery from warehouses has increased noticeably and some thought is now being given to production schedules, which may start earlier than had been anticipated.

Plates

Nearly 8000 tons of tank material is being figured on, but buyers seem to be in no hurry to place orders. The Barnsdall Corpn. has ordered two tanks calling for 500 tons of plates from the Graver Tank & Mfg. Corpn. Miscellaneous plate business is in small, but steady, volume. Various inquiries from the brewing industry total about 500 tons, most of which will be p aced at an early date.

Sheets

New quotations, recently announced, are holding, though purchases are not heavy, most users having contracted for the quarter at the old price levels. Shipments are in good volume and mills are operating at 50 per cent of capacity. Demand, with the automobile industry as the nucleus, continues to spread, and now it is found that radio manufacturers are being added to the active list. Experimental work is being done on cans as containers for beer. These would take the place of the familiar beer bottle. Shipments to beer keg manufacturers are gradually growing heavier.

Rails and Track Supplies

Releases for accessories are not increasing and present indications are that demand will not swing upward in any marked degree until the railroads get under way with real track programs. There are no inquiries for rails and prospects are clouded. Some believe that the enactment of railroad legislation, now under consideration at Washington, will stimulate railroad purchases.

Wire Products

Sales in the early part of May show improvement and fresh inquiry lends support to sellers' belief that the current month will prove to be as good or better than April. General conditions in March held buying in check, but improved sentiment has caused the rural user to enter the market with the result that seasonal demand is lasting longer than usual. Nail business is heavier, but most of it is coming from farm areas. Utilities remain cautious, especially in the West.

Structural Material

Awards are at a very low point, but inquiries are in large volume. The State of Mississippi is in the market for bridges, and the Missouri Pacific is asking for bids on bridge steel. The Rock Island has thrown out bids on a bridge at Seneca, Ill., and will readvertise.

Bars

Although automotive demand seems to have struck at least to a temporary dead level, bar specifications from miscellaneous industries continue to grow. Road machinery builders are using more steel. Farm implement manufacturers are making more auxiliary equipment, such as dairy equipment, and are more seriously considering a general resumption of production as the movement of machinery from warehouse accelerates. Prices for bars are very firm.

Scrap

A mill purchase of heavy melting steel has resulted in a new top price of $8.75 a ton, delivered. Other railroad scrap is also moving up, as is agricultural malleable. Dealers expect prices to go still higher and on that score are holding accumulations. The ideas of the railroads vary. The Illinois Central is offering 18,000 tons and the Wabash also has advertised a large list. On the other hand, the Santa Fe is selling in small lots and has a large accumulation on hand. Available supplies are rapidly being absorbed. The major factor overhanging the market is that price levels may be near the point where they will induce a large influx of scrap and depress prices.

Pig Iron and Scrap Advance in Eastern Pennsylvania

Demand for Iron and Steel Broadens Under Stimulus of Upward Price Trend—Steel Output Unchanged

PHILADELPHIA, May 9.—The iron and steel market in this district generally is characterized by broadening demand for both raw materials and rolled lines. Scrap prices continue to rise, and foundry and basic pig iron have been advanced $1 a ton. Other grades of pig iron also have been adjusted to higher levels. The gain in orders for rolled steel covers principally billets, sheets, merchant bars, structural steel and plates. The bulge in plate business, however, is spotty, some mills reporting a decline for the past week. Demand is from diversified sources and quick delivery is usually asked for. The rising trend of prices has undoubtedly brought out a substantial portion of the new business being booked.

While steel works operations remain at 15 per cent of capacity in this district and lag well behind rates prevalent in Middle Western and Western districts, improvement is expected to reflect itself in this territory soon, barring a check in the upswing.

Railroads continue to purchase only in limited lots, the only outstanding exception being an order for 20,000 to 25,000 tons of rails placed by the Pennsylvania. It has not, so far as known, closed for track accessories.

Pig Iron

Effective for the second and third quarters, prices of foundry and basic iron have been moved up $1 per ton and the differential on foundry grades for silicon content has been restored to 50c. per ton from 25c. Malleable, Bessemer and low phosphorus iron also have been advanced. The new prices, at furnace, establish No. 2 foundry at $14.50; basic, $14.25; malleable base, $15; Bessemer, $15.25, and low phosphorus, $22 to $23. Both inquiries and orders for foundry grades reflect fair improvement, with but little increase in specifications. Orders now range generally from 250 to approximately 1000 tons. Foreign iron also is said to be commanding higher prices.

Plates, Shapes and Bars

Orders are better in all three products, though in plates some mills report a slight letdown. Business is coming from miscellaneous sources, one of the most important being the brewing industry, which is taking tonnage for tank work. Piers at Baltimore for the Pennsylvania Railroad will require about 5000 tons of structural steel, 500 tons of reinforcing bars and approximately 250 tons of sheets piling. Bids for the material, which will be opened May 26, are to be used for estimating purposes in connection with a program that is expected to be arranged after pending railroad legislation is enacted. The Shoemaker Bridge Co., Pottstown, Pa., was awarded 400 tons for the construction of a monastery at Villanova, Pa.

Sheets

Sheet mills report a substantial increase in bookings. Orders cover full-finished grades for automotive consumers, and commercial sheets, especially hot-rolled annealed material, for jobbers and diversified users. Mills are being urged to make quick shipment. The increased prices have stimulated buying.

Warehouse

Expanded business is reported by most jobbers, chiefly for cold-rolled lines, such as sheets, strips, bars and tubing. The gain in orders for hot-rolled material is less marked and is attributed to inability to meet prices of imported steel.

Imports

The following iron and steel imports were received here last week: 3426 tons of chrome ore from Cuba and 2263 tons of pig iron from British India.

Scrap

Prices continue to rise rapidly. Advances range from 50c. to $2 per ton. No. 1 heavy melting steel has increased 50c. to a range of $8.50 to $9, some dealers paying the former price. No. 2 heavy melting steel has made a like advance and is now $7 to $7.50. Heavy axle turnings have shown the greatest increase, going up $2. Dealers report difficulty in getting scrap, both because of growing scarcity and reluctance of yards to sell. Machine shop turnings are going to other districts because of lack of a market here. While still quoted by some dealers at $3.50 to $4, when related to new prices of other material this grade is given a value of $5.50 to $6, at which it is held by some dealers. The tonnage of old material moving to foundries and mills reflects a growing increase.

Sheet Demand Sustained in Southern Ohio

CINCINNATI, May 9. — New warnings of possible increases in Northern pig iron prices have stimulated demand in this district. One south central Ohio melter contracted for 500 tons of Northern foundry iron and two others bought 100 tons each. Purchases of Southern iron were confined to single car lots, but prices on these orders reflected adherence to recent advances. Slight improvement in the melt of automotive and jobbing foundries is evident, bringing foundry operations in this section to the highest level that has prevailed this year. Shipments on contracts have increased, although specifications are still behind the contract rate. One Indiana melter and a southern Ohio consumer are in the market for substantial tonnages, but the exact quantities are undisclosed. A moderate increase in demand for silvery occurred before the effective date of last week's price increase of $1 a ton.

Coke

Foundry coke shipments increased during the week, following the uptrend in foundry operations. Demand for domestic coke reflects the usual seasonal trend.

Steel

Although sheet demand has receded slightly from the year's high of the preceding week, bookings are in excess of 50 per cent of capacity. Better automotive operations have resulted in a noticeable increase in specifications, and other sheet users are taking their normal proportion of orders. Prices are in the ascendency, and many consumers have covered for the rest of this quarter at current quotations. Demand from beer equipment manufacturers has been below expectations, bookings being less than 1 per cent of total orders.

Scrap

Dealers continue to cover in anticipation of future business, but price pressure from the mills is retarding the movement of scrap to consumers. Bids on important items have been advanced 25 to 50c. a ton, but scrap sources to a large extent are still "frozen." Bids on current lists of the Norfolk & Western, the Chesapeake & Ohio and the Southern railroads are expected to supply a good test of buying prices.

Scrap Continues to Advance at Detroit

DETROIT, May 9.—Scrap prices continued their climb to higher levels the past week, with heavy melting steel and other items up 25c. to 75c. a ton. No. 2 busheling, sheet clips and flashings were the only grades not affected by the upswing. Increased automobile manufacture is resulting in the largest production of scrap in months, for which dealers are bidding briskly. A local dealer has dispatched a boatload of scrap to Cleveland for transshipment to a northern Ohio steel maker.

Automotive Industry Crowds Cleveland Mills for Steel

Demand from Motor Car Companies is Sustained—Business from Other Sources Shows Steady Expansion

CLEVELAND, May 9.—Demand for finished steel has shown a further increase. Business from the automotive industry has held to its recent volume and orders from miscellaneous consumers show a gain. The foundry industry, which heretofore except in the automotive industry has shown few signs of revival, has become more active.

Ingot output in Cleveland remains unchanged at 38 per cent of capacity. The Corrigan, McKinney Steel Co. has put on an additional open-hearth furnace, now operating nine out of 14, and plans to light another furnace this week. This increase is offset by the shutting down of one furnace by the Otis Steel Co.

Additional releases for steel have come from some of the automobile plants to cover requirements due to enlarged schedules, and producers are being crowded by automobile companies for deliveries. The automotive industry is expected to maintain its present production schedules at least until the middle of June.

Demand from railroads for steel for car repair work shows some increase. The electric refrigerator industry continues very busy.

The upward price tendency on some products has brought out inquiries from consumers of the heavier rolled steel products not under contract, for contracts for the remainder of the quarter, and some want to cover for the third quarter at prevailing prices. In the meantime there is considerable talk of advances for the third quarter. While the recent price advances on sheets and hot-rolled strip are being generally maintained on new business, large buyers, principally in the automotive industry, are covered for the quarter at the old prices, and the advances will not be subjected to a real test until large consumers come into the market for the third quarter.

Demand for pig iron is expanding and prices are firm. The advance in scrap prices has been checked.

Pig Iron

Cleveland interests sold 7000 tons of foundry and malleable iron during the week, largely for the third quarter. New inquiry for that delivery includes 2000 tons of malleable iron for an Indiana melter and 1000 tons of foundry iron for a Dayton foundry. While part of the present buying perhaps is of a speculative character, some of the foundries evidently are inclined to abandon their recent practice of carrying practically no iron in stock. Several purchases were made by Cleveland foundries that have long been inactive. The foundry industry shows a definite up trend. Good shipments are being maintained to the automotive industry. May shipments will show a sharp gain over April. The market is firm at $14.50, Lake furnace, for foundry and malleable iron and $15, Cleveland, for local delivery.

Sheets

Business is holding up to the recent gain. Additional specifications for fair tonnages for quick shipment continue to come from the automotive industry and in some cases producers are unable to make deliveries as promptly as their customers desire. Demand from the refrigerator industry continues good and some of the stove companies are doing better. The barrel industry is rather slack. Miscellaneous orders from stamping plants show some gain. There has not been much test of the advanced prices, as the automotive industry and some other large consumers covered for the quarter at the old prices. On new business the market is firm at the higher prices.

Bars, Plates and Shapes

Demand for merchant bars continues to broaden. The automotive industry is taking a good tonnage and business from miscellaneous sources has increased. Some good inquiries are pending from makers of road building machinery, who recently have shown little activity. While reinforcing bars are quiet, 1000 tons will be required for a Cleveland waterworks reservoir which is expected to be advertised in three weeks. The Pere Marquette railroad has placed 225 tons of plates for car repair work. Activity in the structural field continues light. Merchant bars are firm at 1.65c., Cleveland. For plates and shapes 1.60c., Pittsburgh, is being maintained on most business. The new 1.55c., Cleveland, price on reinforcing bars has not been tested.

Strip Steel

Demand for hot-rolled strip continues good, and some new releases have come from the automobile plants that had previously ordered steel for May delivery but find that they need additional material because of increases in production schedules. The automotive industry and other large consumers are covered at the 1.45c. price. Most mills are holding to 1.55c. for new business, and some sales have been made at the advance. Cold-rolled strip is unchanged at 1.80c. to 2c. One producer has advanced its minimum price to 1.90c.

Iron Ore

The Steel Corporation has started a number of boats and other shippers will place several ore carriers into commission later in the month. Consequently shipments are expected to show considerable gain over the same month last year. Shipments from Lake Erie docks in April were 104,395 tons, as against 204,016 tons in April, 1932. The balance on docks at these ports May 1 was 4,969,363 tons, compared with 5,559,264 tons on the same date a year ago.

Scrap

The market is less excited than a week ago and the maximum prices that dealers were offering on some grades to cover against outstanding contracts are less in evidence. No new orders from mills are reported. The dealers' price for No. 1 heavy melting steel for delivery to a local mill has settled to $9.50. For shipment to Valley mills $11.25 to $11.50 is being paid. The New York Central Railroad last week sold 3000 tons of old car wheels to Ohio mills at $11 per ton, an advance of $3 over recent prices.

Pig Iron and Scrap Higher at Boston

BOSTON, May 9.—Buffalo pig iron prices are 25c. a ton higher, with sales reported on the new basis. Eastern Pennsylvania iron prices also have stiffened to $14.50 a ton base, with 50c. differentials, and a little iron has been sold at the new levels. A differential of 50c. a ton has been applied on Alabama No. 2X iron, although no sales are reported. It is intimated the Mystic Iron Works will shortly raise its prices, and that foreign iron prices will be advanced, while charcoal iron makers have informed local representatives higher prices are in the making. Furnaces are disinclined to quote for delivery beyond the third quarter. Past week's sales were 2200 tons, including 1000 tons of Dutch iron to a Massachusetts melter, 700 tons of Mystic, and smaller tonnages of Buffalo and eastern Pennsylvania iron. There are no open inquiries in the market. Due to an improvement in Connecticut, the New England weekly melt increased 10 per cent.

Scrap prices are higher and inquiries are increasing in number, although business is not active because owners of material are inclined to hold for still higher prices. No. 1 heavy melting steel, T-rails, bundled skeleton, forge flashings and shafting are $1 a ton higher as compared with a week ago, with smaller advances on other materials. The most recent sales of No. 1 heavy melting steel were at $5.65 to $5.67 a ton on cars shipping point. Heavy breakable cast was moved at $4.50 a ton, on cars, and No. 2 steel at $3.50 to $3.75.

Several New England cities will shortly be in the market for substantial tonnages of cast iron pipe.

Widening Circle of Buyers Drawn Into New York Market

Demand for Both Pig Iron and Steel Is Sustained—Initiative Has Passed from Producers to Consumers

NEW YORK, May 9.—Steel demand is perhaps not quite so active as a week ago, when the announcement of price advances on sheets and strip drove in considerable business at previous quotations. Nevertheless the broadening of interest among buyers is still much in evidence. Consumers who have not placed orders for a year or more are again in the market, evidently in the belief that changed conditions warrant some replenishment of their stocks.

Tin plate and sheets are conspicuous in current mill bookings, although there are signs of impending improvement in the heavier lines. Jobbers and manufacturing users of steel are ordering larger quantities of the heavier products to build up their depleted inventories. The New York Central will soon purchase about 12,000 tons of rails and other railroads are expected to place orders for various products shortly, possibly through the exchange of scrap for finished steel. The extent of railroad buying, of course, will depend on the trend of traffic and the character of the railroad rehabilitation program finally launched at Washington.

Private construction work is still at a low ebb, although there is an increasing tendency to take action on pending projects. A gas pipe line in New York State for the Lycoming Gas Co., calling for 1200 tons of 8⅝ and 10¾ in., may be awarded soon. The Texas Co. has awarded a contract for repairs on a tanker, requiring 500 tons of steel, to the Robins Dry Dock & Repair Co., New York. The Pan-American Petroleum & Transport Co., subsidiary of the Standard Oil Co. of Indiana, will build a $10,000,000 oil and gasoline refinery and ship loading terminal at Houston, Tex., which will take upward of 10,000 tons of steel.

Rising prices of scrap and pig iron have tended to stiffen prices on plates. Concessions below 1.40c., Coatesville, are reported to have disappeared. Recently advanced prices on sheets and hot-rolled strip have not undergone much of a test in sales so far, but there seems to be no doubt that they will hold in view of the general trend of the market. Reports that tin plate will be advanced are discounted here, in view of the fact that most of the contract tonnage for this year has been placed.

Pig Iron

Activity continues to be brisk. Bookings in the past week approximated 6500 tons, compared with 5000 tons the week before and 4000 tons a fortnight ago. Specific inquiry has dwindled, but a fair volume of business is being tentatively figured on. Buying interest is chiefly in forward shipment. Evidence of a slight expansion in melt is appearing, but the improvement is yet too thin to reflect an appreciable lift in the average melting rate for the district. Jobbing foundries are notably lagging in scheduling larger melts. The General Electric Co. is reported to have closed on 800 tons for third quarter shipment to its Elmira, N. Y., plant, and the Whitin Machine Works, Whitinsville, Mass., has purchased against its recent inquiry for 1000 tons. The fourth quarter inquiry of the A. P. Smith Mfg. Co., East Orange, N. J., is still open. Eastern Pennsylvania producers have advanced their base quotations $1 a ton to $14.50, furnace, and have instituted a 50c. silicon differential to replace the former premium of 25c. Buffalo No. 2 plain is strong at $14, furnace. The irregular exchange situation precludes an accurate gage of quotations on foreign brands.

Reinforcing Bars

Fresh demand includes 163 tons for a water supply system at the Harlem Valley State Hospital, Wingdale, N. Y.; 133 tons for a cold storage building at Mitchel Field, N. Y., and 128 tons for a baking plant at Jamaica, N. Y. The Government Marine Hospital project at Stapleton, N. Y., has been abandoned. No important lettings were reported during the past week. Prices reflect firmness, with mill lengths quotable at 1.40c. a lb., and cut lengths at 1.55c. a lb., Pittsburgh.

Scrap

With steel-making grades enjoying an enlivened demand from domestic mills, dealers with export commitments have had to raise their offers $1 to $1.50 a ton for heavy melting steel. No. 1 steel is now being purchased at $6 to $6.50, and No. 2 at $4.50 to $5, on barge. As a consequence of firming values in domestic markets and of irregular foreign exchange, brokers are reluctant to enter further export orders. Higher tendencies characterize several other grades, including cast scrap, stove plate and railroad wrought.

Steel Output Reaches 35 Per Cent in Valleys as Demand Broadens

YOUNGSTOWN, May 9.—With continued strong support from the automotive industry, demand for finished steel products in the Valleys is becoming more diversified and gaining momentum which local executives are beginning to believe will do much to offset the usual summer slump. The placing of contracts for the remainder of the quarter which must be specified against by the end of June has given mills their first semblance of a backlog in a long time, and the prospect of higher selling prices in the second half of the year generally assures the ordering out of this material next month.

Automobile production schedules during May seem now to be definitely set at a level fully as high as in April, and movement of bars, sheets and strip steel to parts makers in Michigan and northern Ohio is unabated. Fabricators and stamping plants in the Valleys are taking out steel for kitchen utensils, metal sinks, washing machine equipment, steel barrels, beer bottle cases and other materials for the brewing industry. In the case of the latter, however, experimentation is uppermost, and steel makers are cooperating with fabricators in the development of products both in corrosion-resisting and ordinary carbon steel which may offer an important future outlet for the industry. A fair tonnage of plates has been taken for brewery tanks. Demand for miscellaneous steel products from jobbers is increasing and consignment shipments of pipe to this source constitute the chief activity in tubular goods. Oil country goods are dormant and there is little line pipe activity. Expanding demand for bar mill products for widely diversified uses is one of the most encouraging recent developments.

Blast furnace and open-hearth activity continues to expand and steel ingot production in the Valleys and nearby northern Ohio mills will likely average 35 per cent of capacity during the week. Three steel works blast furnaces have resumed production during the last fortnight. Output of tin plate in the district averages fully 75 per cent. Sheet and strip units are engaged at about 35 per cent, while bar mills are running at about 30 per cent. Pipe production continues very light and plate schedules have increased only moderately. Steel producers are devoting considerable attention to equipment which has been idle for a long time, as recent activity has brought all capacity into service which has been used for more than a year.

Finished steel prices are gaining strength, but some of the tonnage now being shipped was booked earlier in the year at the low prices then prevailing. Recently announced quotations of 2.70c., Pittsburgh, on gal-

vanized sheets, 2.10c. on hot-rolled annealed sheets, 2.45c. on light cold-rolled sheets and 1.55c. on hot-rolled strip have applied on small spot orders placed in the last week. While advances have not been announced on the heavy products, higher quotations on wire products are in prospect and attempts to stabilize cold-rolled strip are still being made. The principal semi-finished products are firm at $26, Pittsburgh or Youngstown.

The pig iron market is still quiet in this district, although inquiries are more numerous. Current quotations of $15 on Bessemer iron, $14.50 on foundry and malleable and $14 on basic are strong. Scrap is the center of interest in the raw material field with a considerable divergence between dealer asking prices and recent selling levels. No. 1 heavy melting steel has been bought at $11.50, delivered Valley mills, and recent railroad lists have brought as high as $12.50. Dealers are unwilling to sell at less than $13.

Steel Output Off at Birmingham

BIRMINGHAM, May 9.—Pig iron shipments this month have shown slight improvement over the early April rate, but the aggregate movement is still comparatively small. Foundry requirements remain mostly irregular and uncertain, as operations are largely dependent on week-to-week bookings. Pipe shows some signs of improvement and the local plants are looking forward to a better month. El Paso, Tex., opened bids last week on 850 tons. No award has yet been made. Stove plants at Rome, Ga., and Nashville, Tenn., are now on better schedules for the time being. Current pig iron sales are light, due to the advance bookings of early April, but enough new business has been booked to firmly establish the $12 base. Since the first of the month three blast furnaces have been producing, one being on basic iron and two on foundry. It is likely that this number will remain unchanged throughout the month. Scrap bookings have shown improvement during the past several weeks, though no price advances have yet been made.

Steel

Although the market is not particularly active, a fair volume of new business continues and the improved trend of last month is being maintained. As for some time past, orders are generally small and varied. Seasonal demand for roofing sheets has receded somewhat, but flat sheets are holding to a steady course. Some lines of wire products have a fair demand. Heavier products are sluggish with tonnage exceedingly limited. Seven open-hearths were worked last week. Schedules this week call for six. This is the first change since early April.

Fabricated Structural Steel

Lettings Light—New Projects Gain

INCLUDING 2350 tons additional on revised figures for superstructures for the San Francisco-Oakland bridge, awards total only 4700 tons, compared with 126,135 tons in the previous week and 12,350 tons two weeks ago. New projects of 38,310 tons are the largest since the second week in February. Two outstanding jobs are 11,800 tons for the Rip Van Winkle bridge over the Hudson River at Catskill, N. Y., and 10,000 tons for an oil refinery and ship-loading terminal at Houston, Tex. Awards for the week follow:

NORTH ATLANTIC STATES

Providence, R. I., 100 tons, bakery, to Lehigh Structural Steel Co.

Providence, 640 tons, gasoline storage tanks for Richfield Oil Corpn., at Providence, Syracuse and Rochester, N. Y., to Steel Fabricating Co. of Muskegon, Muskegon, Mich.

State of Connecticut, 240 tons, tower line for Connecticut Light & Power Co., to Blaw-Knox Co.

Ulster County, N. Y., 150 tons, highway bridge at Hurley, to Lackawanna Steel Construction Corpn.

Hoboken, N. J., 110 tons, boiler house for Delaware, Lackwanna & Western Railroad, to American Bridge Co.

Philadelphia, 100 tons, addition to Trainer brewery, to Belmont Iron Works, Philadelphia.

Villanova, Pa., 470 tons, monastery for Villanova College, to Shoemaker Bridge Co.

Coaldale, Pa., 140 tons, miscellaneous steel for Lehigh Navigation Coal Co., to American Bridge Co.

Seaboard Air Line, 160 tons, two spans over Middle Oconee River, to Virginia Bridge & Iron Co., Inc.

CENTRAL STATES

Duluth, Minn., 230 tons, Miller Memorial Hospital, to American Bridge Co.

WESTERN STATES

San Francisco, 122,350 tons, revised figures on superstructures for San Francisco-Oakland bridge, to Columbia Steel Co.

San Francisco, special material for San Francisco-Oakland bridge: 900 tons cast steel, 4600 tons heat-treated eyebars, 255 tons carbon steel eyebars, 3680 tons nickel steel, 300 tons manganese steel, 20,700 tons cables and fastenings, all to Columbia Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Providence, R. I., 200 tons, newspaper plant.

New York, 260 tons, garage for West Chelsea Construction Co.

Jamaica, N. Y., 160 tons, building for Krug Baking Co.

Catskill, N. Y., 11,800 tons, Rip Van Winkle bridge over Hudson River.

Elmira, N. Y., 2000 tons, bridge for Erie Railroad.

Coxsakie, N. Y., 1500 tons, State vocational institution; bids May 17.

Baltimore, 5000 tons, export and import pier No. 1 for Pennsylvania Railroad.

SOUTH AND SOUTHWEST

Crittenden, Ky., 149 tons, highway bridge, bids to be opened May 24.

Miami, Fla., 350 tons, passenger station for Pan American Airways.

State of Mississippi, 900 tons, highway bridges.

Houston, Tex., 10,000 tons, Pan-American Petroleum & Transport Co., oil and gasoline refinery and ship-loading terminal.

Myrtle, Ark., 950 tons, bridge for Missouri Pacific Railroad.

CENTRAL STATES

Chicago, 350 tons, building for Chicago Carton Co.

Seneca, Ill., 250 tons, old bids out and new tenders will be taken on changing a Rock Island fixed span to a movable bridge.

Kansas City, Mo., 2500 tons, bridge over Missouri River for Regional Bridge Co.; bids opened May 10.

WESTERN STATES

Stanislaus and San Joaquin Counties, Cal., 414 tons, State highway bridge over Stanislaus River; bids May 24.

Los Angeles, 279 tons, three bridges on Ramona Boulevard.

Los Angeles, 500 tons, Soto Street bridge over Pacific Electric Railway; bids probably in June.

San Gabriel, Cal., 100 tons, post office.

San Bernardino, Cal., 800 tons, crossing over Santa Fe tracks.

San Francisco, 13,550 tons, West Bay substructure on San Francisco-Oakland bridge; general contract to Transbay Construction Co.

San Francisco, 1350 tons, San Francisco anchorage on San Francisco-Oakland bridge; general contract to Healy-Tibbets Construction Co.

San Francisco, 1020 tons, East Bay substructure on San Francisco-Oakland bridge; general contract to Bridge Builders, Inc.

San Francisco, 1500 tons, Yerba Buena Island Crossing on San Francisco-Oakland bridge; general contract to Clinton Construction Co.

Linn County, Ore., 103 tons, State highway bridge over Santiam River; bids May 17.

FABRICATED PLATE

AWARDS

Chelsea, Mass., 200 tons, oil tanks, to Chicago Bridge & Iron Co.

Buffalo, 150 tons, deck barge for United States Lighthouse Service, to McClintic Marshall Corpn.

Petrolia, Pa., 130 tons, five tanks for W. H. Daugherty & Son Refining Co., to Warren City Tank & Boiler Co.

Gladewater, Tex., 500 tons, two 80,000-gal. tanks for Barnsdall Corpn., to Graver Tank & Mfg. Corpn., Chicago.

Seattle, 4200 tons, Cedar River pipe line, to Puget Sound Machinery Depot.

Los Angeles, 200 tons, tanks, to Western Pipe & Steel Co.

NEW PROJECTS

Los Angeles, 4125 tons, Bouquet Canyon Dam penstock; bids soon.

San Francisco, 1100 tons, Yerba Buena Island crossing on San Francisco-Oakland bridge; Clinton Construction Co., general contractor.

Railroad Equipment

British American Oil Co., Toronto, has purchased 50 40-ton tank cars from National Steel Car Corpn., Ltd.

Non-Ferrous Metals Reflect Strength at Higher Levels

Tin Soars to 36c. a Lb.; Copper, Lead Moderately Higher—Zinc Firm on Tight Ore Situation

NEW YORK, May 9.—Buoyant sentiment, curtailment prospects and steady consuming demand have imparted a strong tone to the electrolytic copper market. Predicated upon these favorable factors, on May 5 sellers withdrew all previous quotations and established their offerings on the basis of 6.75c. a lb., delivered Connecticut. Although consumer reaction to the advance revealed no eagerness to cover freely, buying from day to day has been steady. Sellers, on the other hand, are evidently disposed to limit their offerings. Metal in some quarters is available for delivery through September, while in others it is restricted to shipment through August. In the foreign markets, electrolytic has also tended toward higher levels, ranging from 6.12½c. early last week to today's postings of 6.50c. to 6.75c. a lb., c.i.f. Continental ports. Bookings abroad have been somewhat heavier than those in domestic centers.

The visit of the Katanga representative has been discounted so far as it relates to a renewal of discussions pertaining to rescheduling world production quotas. Meanwhile, alinement of the principal American producers on a basis of 10 per cent of capacity is gaining assurance as an eventual certainty.

Tin

Spot Straits tin was quoted at a new high level at New York yesterday, when it climbed to 36c. a lb., an advance of 3½c. for the past seven-day period. Impetus for the rise came from a strong consumer demand and higher sterling exchange. Trading has quieted down perceptibly, however, since the 36c. price was established, and buying appears momentarily spent. The present lull is considered a natural aftermath of the heavy buying that occurred in the past several weeks, during which purchases are estimated to have been far greater than actual consuming needs. Interest in future tin is still retarded by sterling premiums. Several sellers, as a result of heavy withdrawals from New York stocks, are very short of prompt metal; in fact, some dealers have disposed of their entire spot holdings. The short position of spot Straits, in addition to the ascending values, has in a measure diverted buyers to the lower-priced English refined tin and Chinese tin. Substantial buying and favorable trade sentiment effected further sharp gains last week in London. The market there today reflected average gains of £9 a ton for the week, with this morning's postings £182 10s. a ton for spot standard, £183 5s. for future standard and £196 10s. for spot Straits. The Singapore market today, at £203 5s., represented an advance of £19 for the week.

Lead

The leading factors yesterday instituted an advance of $3 a ton to 3.65c. a lb., New York, and 3.52½c., St. Louis. The advance, while sponsored partly by consumer demand, was chiefly attributable to the sold-up position of large smelters who booked substantial tonnages during the past two weeks. Lead values are further bolstered up by the balancing effects of curtailment programs now in effect and increased deliveries into consumption. Based upon sales for April, statistics for that month are expected to disclose deliveries of approximately 25,000 tons, and prospects for May deliveries promise a possible increase over those in April. About 20 per cent of consumer requirements for May remain uncovered, while approximately 50 per cent of June needs are unsatisfied. Sellers are therefore expectant that a satisfactory volume of buying will attend the remaining weeks of May.

Zinc

Prime Western, after a four-day lull during which the price dipped to 3.70c. a lb., East St. Louis, displayed stronger tendencies yesterday, when it rebounded to its previous level of 3.75c., East St. Louis, or 4.12c., New York. Although market sentiment has been heartened by favorable April statistics, which showed a substantial increase in unfilled orders and an increase of only 2050 tons in smelters' stocks, the key factor affecting prices is the continued stringent situation in the Joplin ore fields. Ore prices are stronger, with flotation at $24 to $25, and mill grades at $25. Purchases of ore last week aggregated 2700 tons, against production of 3300 tons. Shipments for the week totaled 4350 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	May 3	May 4	May 5	May 6	May 8	May 9
Electrolytic copper, N. Y.*	6.25	6.25	6.50	6.50	6.50	6.50
Lake copper, New York	6.50	6.50	6.75	6.75	6.75	6.75
Straits tin, Spot, N. Y.	32.75	33.50	34.60	....	36.00	36.00
Zinc, East St. Louis	3.70	3.70	3.70	3.70	3.75	3.75
Zinc, New York	4.07	4.07	4.07	4.07	4.12	4.12
Lead, St. Louis	3.37½	3.37½	3.37½	3.37½	3.52½	3.52½
Lead, New York	3.50	3.50	3.50	3.50	3.65	3.65

*Refinery quotations price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.25c. a lb., New York.
Brass ingots, 85-5-5-5, 6.50c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	38.00c. to 39.00c.
Tin, bar	40.00c. to 41.00c.
Copper, Lake	7.75c. to 8.50c.
Copper, electrolytic	7.50c. to 8.00c.
Copper, castings	7.25c. to 8.25c.
*Copper sheets, hot-rolled	14.37½c.
*High brass sheets	12.25c.
*Seamless brass tubes	14.00c.
*Seamless copper tubes	13.12½c.
*Brass rods	9.75c.
Zinc, slabs	5.00c. to 5.50c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.62½c. to 5.62½c.
Lead, bar	6.00c. to 7.00c.
Lead, sheets	7.25c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	16.00c. to 17.00c.
Solder, ½ and ½	23.50c. to 24.50c.
Babbitt metal commercial grade	42.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	40.50c.
Tin, bar	42.50c.
Copper, Lake	7.87½c.
Copper, electrolytic	7.87½c.
Copper, casting	7.62½c.
Zinc, slab	4.50c. to 5.00c.
Lead, American pig	4.37½c. to 4.87½c.
Lead, bar	7.75c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	17.75c.
Babbitt metal, high grade	44.50c.
Solder, ½ and ½	24.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.25c.	5.875c.
Copper, hvy. and wire	5.00c.	5.75c.
Copper, light and bottoms	4.00c.	4.50c.
Brass, heavy	2.75c.	3.00c.
Brass, light	2.00c.	2.37½c.
Hvy. machine composition	3.50c.	4.25c.
No. 1 yel. brass turnings	3.00c.	3.50c.
No. 1 red brass or compos. turnings	3.25c.	3.75c.
Lead, heavy	2.625c.	3.125c.
Zinc	1.75c.	2.25c.
Cast aluminum	4.50c.	5.75c.
Sheet aluminum	9.50c.	11.00c.

The new office building of the Worthington Pump & Machinery Corpn., situated adjacent to the corporation's plant at Harrison, N. J., was opened May 1. The general and executive offices, formerly situated at 2 Park Avenue, New York, have been moved to the new location for better coordination with manufacturing and sales operations. The local sales office will be continued at 2 Park Avenue.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributers)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.55c.
F.o.b. Birmingham, mill lengths	1.55c.
F.o.b. Cleveland	1.55c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, . . . Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.598c. to 1.698c.
C.i.f. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.847c.
C.i.f. Pacific ports (standard)	2.-
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	2.50
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill, 1½ in.	3.00c.
1-3/16 to 1½ in.	2.50c.
1-9/16 to 1⅞ in.	2.35c.
1-15/16 to 2⅜ in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.40c. to 1.50c.
No. 10, f.o.b. Chi'o mill	1.50c. to 1.60c.
No. 10, del'd Philadelphia	1.71c. to 1.81c.
No. 10, f.o.b. Birming'm	1.55c. to 1.65c.
No. 10, c.i.f. Pacific Coast Ports	2.12½c.

Hot-Rolled Annealed

No. 10, Pittsburgh	1.55c. to 1.65c.
No. 10, Chicago mills	1.65c. to 1.75c.
No. 10, Birmingham	1.70c. to 1.80c.
No. 10, Pacific Coast ports	2.27½c.
No. 10, wrought iron, Pittsburgh	3.60c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.00c. to 2.10c.
No. 24, f.o.b Chi'o mills	2.10c. to 2.20c.
No. 24, del'd Philadelphia	2.31c. to 2.41c.
No. 24, f.o.b. Birming'm	2.15c. to 2.25c.
No. 24, c.i.f. Pacific Coast ports	2.75c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pitts'h	1.90c. to 2.05c.
No. 10 gage, f.o.b. Chicago mills	2.00c. to 2.15c.
No. 10 gage, del'd Phila.	2.21c. to 2.36c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pitts'h	2.30c. to 2.45c.
No. 20 gage, f.o.b. Chicago mills	2.40c. to 2.55c.
No. 20 gage, del'd Phila.	2.61c. to 2.76c.
No. 20 gage, del'd Pacific Coast ports,	2.95c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.70c.
No. 24, f.o.b. Chicago mill	2.80c.
No. 24, del'd Philadelphia	3.01c.
No. 24, f.o.b. Birmingham	2.85c.
No. 24, c.i.f. Pacific Coast ports	3.25
No. 24, wrought iron, Pittsburgh	4.95.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c.
No. 28, Chicago mill	2.40c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c. to 1.55c.
All widths up to 24 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.50c. to 1.65c.
Cooperage stock, Chicago	1.60c. to 1.65c.

Cold-Rolled Strips

F.o.b. Pittsburgh	1.80c. to 2.00c.
F.o.b. Cleveland	1.80c. to 2.00c.
Del'd Chicago	2.20c. to 2.30c.
F.o.b. Worcester	2.00c. to 2.10c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

Extras of 10c. a 100 lb. on mixed and joint carloads, 20c. on pool carloads and 30c. on less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.85
Smooth coated nails	1.85
Galvanized nails	3.35
	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.55
Galvanized staples	2.80
Barbed wire, galvanized	2.35
Woven wire fence No. 9 gage, base column, per net ton	$50.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Black	Galv.	Wrought Iron Inches	Black	Galv.
⅛	55	33	⅛	+91½	+138
¼ to ⅜	60½	42	¼ & ⅜	+1½	+21½
½	65½	54	½	31½	15
¾	69	59	¾	36½	20½
1 to 3	71	62	1&1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	66	57	2	37	22½
2½ to 6	69½	60½	2½ to 3½	38	25
7 and 8	68	58	4 to 8	40	28½
9 and 10	67	57	9 to 12	38	24½
11 and 12	66	56			

Butt Weld, extra strong, plain ends

¼	52	37	⅛	+13	+45½
¼ to ⅜	58	45	¼ & ⅜	+2½	+34½
½	63½	54½	½	22½	17½
¾	68	59	¾	37½	22½
1 to 3	70	62	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	65	57	2	40	26
2½ to 6	69	61	2½ to 4.5	45½	33
7 to 8	68	58	4½ to 6.45		32½
9 and 10	67	57	7 & 8	46	33
11 and 12	66	56	9 to 12	41½	30

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—4¾ in.	54	2½ in.—2¾ in.	16
5 in.	57	3 in.	17
4½ in. to 6 in.	46	3½ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel, f.o.b. mill)	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.15
Spikes, ½-in. and larger	2.30
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	75
Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex nuts, blank or tapped	75

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh	75, 25 and 10
Stove bolts in packages, Ch'go.	75, 25 and 10
Stove bolts in pkgs., Cleveland.	75, 25 and 10
Stove bolts in bulk, P'gh	80
Stove bolts in bulk, Chicago	80
Stove bolts in bulk, Cleveland	80
Tire bolts	60 and 10

Discounts of 75 per cent off on bolts and nuts applied on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 10
F.o.b. Cleveland	70, 10 and 10
F.o.b. Chicago	70, 10 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ¾ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	40
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in., inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in., inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in., inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in., inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

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Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$1.75 to $2.00
Foundry, f.o.b. Connellsville Prompt	2.50 to 4.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.00 to $1.15
Mine run coking coal, f.o.b. W. Pa.	1.10 to 1.25
Gas coal, ¾-in., f.o.b. Pa. mines	1.25 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.20 to 1.30
Steam slack, f.o.b. W. Pa. mines	0.25 to 0.35
Gas slack, f.o.b. W. Pa. mines	0.35 to 0.45

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.00c.
No. 4 industrial	4.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Penn.	$35.00	$30.00
Maryland	35.00	30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	30.00
Kentucky	35.00	30.00
Missouri	35.00	30.00
Illinois	35.00	30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$41.40
4-in., del'd Chicago	44.40
6-in., and larger, del'd New York,	$35.30 to 36.30
4 in., del'd New York	38.30 to 39.30
6-in., and larger, Birm'ham	33.00
4-in., Birmingham	36.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton, f.o.b. Valley furnace:

Basic	$14.00
Bessemer	15.00
Gray Forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	14.50
Low phos., copper free	23.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per Gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.50
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.26 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent	23.67
Bess. ferrosil'n, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$15.50
Del'd St. Louis	16.35
Malleable, f.o.b. Granite City	16.00
Northern No. 2 fdy., del'd St. Louis	17.80
Northern malleable del'd	17.80
Northern basic, del'd	17.80
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	15.85

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'd east N. J.	$17.41
Buffalo malleable, del'v'd Eastern N. J.	17.91
East Pa. No. 2 fdy.	16.02
East Pa. No. 2X fdy.	16.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$15.82
Ala. fdy., sil. 2.25 to 2.75	16.07
Tenn. fdy., sil. 1.75 to 2.25	15.82
N'th'n No. 2 foundry	17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.00
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent	21.75
Stand. low. phos., Valley	23.00
Southern No. 2 fdy.	$16.14 to 17.14

Prices are f.o.b furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.00 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$15.34
East. Pa. No. 2X	15.84
East. Pa. No. 1X	16.34
Basic (del'd east. Pa.)	15.09
Malleable	15.84
Stand. low phos. (f.o.b. east Pa. furnace	$22.00 to $23.00
Cop. b'r'g' low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.50
Basic	12.00

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.30
*Buffalo, sil. 2.25 to 2.75	19.55
†Buffalo, sil. 1.75 to 2.25	18.28
†Buffalo, sil. 2.25 to 2.75	18.53
†Ala., sil. 1.75 to 2.25	$15.64 to 16.64
†Ala., sil. 2.25 to 2.75	16.14 to 17.14

Freight rates: $5.05 all rail from Buffalo, and $3.66 to $4.03 rail and water from Buffalo when $1.25 barge and $2.13 to New England freight rate are obtainable; $5.64 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	61.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$24.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$19.00	14%	$21.00
11%	19.50	15%	21.50
12%	20.00	16%	22.00
13%	20.50		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$17.00	12%	$20.00
7%	17.50	13%	20.50
8%	18.00	14%	21.00
9%	18.50	15%	21.50
10%	19.00	16%	22.00
11%	19.50		

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to $2.80
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	$5.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68½% iron	9c.
Iron, basic or foundry, Swedish, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9c.
Manganese, Caucasian, washed 52%	*28c.
Manganese, African, Indian, 50-52%	*21c. to 22c.
Manganese, Brazilian, 46 to 48%	*13c.
	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00
	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.00
Chrome, 45% Cr_2O_3, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel 85-5, f.o.b. Kentucky and Illinois mines	$11.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	13.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium, fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00 to $12.50
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	12.50 to 13.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.50 to 13.00
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.50 to 11.00
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.50 to 9.00
Short shov. steel turnings	8.50 to 9.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Cast iron carwheels	11.00 to 11.50
Heavy breakable cast	9.00 to 9.50
No. 1 cast	10.00 to 11.00
Railr. knuckles and couplers	13.00 to 14.00
Rail, coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	13.00 to 13.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton		
Heavy melting steel	$8.25 to	$8.75
Shoveling steel	8.25 to	8.75
Hydraulic comp. sheets	$6.50 to	$7.00
Drop forge flashings	5.50 to	6.00
No. 1 busheling	6.50 to	7.00
Rolled carwheels	9.50 to	10.00
Railroad tires	9.50 to	10.00
Railroad leaf springs	9.50 to	10.00
Axle turnings	7.00 to	7.50
Steel couplers and knuckles	9.50 to	10.00
Coil springs	9.50 to	10.00
Axle turnings (elec. fur.)	7.50 to	8.00
Low phos. punchings	9.50 to	10.00
Low phos. plates, 12 in. and under	9.50 to	10.00
Cast iron borings	5.00 to	5.50
Short shoveling turnings	5.00 to	5.50
Machine shop turnings	4.00 to	4.50
Rerolling rails	9.00 to	9.50
Steel rails, less than 3 ft.	9.00 to	9.50
Steel rails, less than 2 ft.	9.50 to	10.00
Angle bars, steel	9.00 to	9.50
Cast iron carwheels	8.50 to	9.00
Railroad malleable	9.00 to	9.50
Agricultural malleable	6.50 to	7.00

Per Net Ton		
Iron car axles	$12.00 to	$12.50
Steel car axles	10.00 to	10.50
No. 1 railroad wrought	6.00 to	6.50
No. 2 railroad wrought	6.50 to	7.00

No. 2 busheling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	8.00 to	8.50
Clean automobile cast	8.00 to	8.50
No. 1 railroad cast	7.00 to	7.50
No. 1 agricultural cast	7.50 to	8.00
Stove plate	6.50 to	7.00
Grate bars	6.75 to	7.25
Brake shoes	7.00 to	7.50

* Relaying rails, including angle bars in match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$8.50 to	$9.00
No. 2 heavy melting steel	7.00 to	7.50
No. 1 railroad wrought	....	11.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	....	6.00
Hydraulic compressed, old	....	5.00
Machine shop turnings	3.50 to	4.00
Heavy axle turnings	7.50 to	8.00
Cast borings	3.50 to	3.75
Heavy breakable cast	....	9.50
Stove plate (steel works)	....	7.00
No. 1 low phos. heavy	10.00 to	10.50
Couplers and knuckles	10.00 to	10.50
Rolled steel wheels	10.00 to	10.50
No. 1 blast furnace	3.50 to	3.75
Spec. iron and steel pipe	....	8.00
Shafting	13.00 to	13.50
Steel axles	12.00 to	13.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels	9.50 to	10.00
No. 1 cast	10.00 to	10.50
Cast borings (chem.)	8.00 to	10.00
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	....	$9.50
No. 2 heavy melting steel	....	9.00
Compressed sheet steel	$8.50 to	9.00
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	8.00 to	8.50
Machine shop turnings	6.25 to	6.75
Short shoveling turnings	6.75 to	7.25
No. 1 busheling	7.50 to	8.00
Steel axle turnings	7.50 to	8.00
Low phos., billet crops	10.00 to	11.00
Cast iron borings	6.75 to	7.25
Mixed borings and short turnings	6.75 to	7.25
No. 2 busheling	6.50 to	7.00
No. 1 cast	10.00 to	10.50
Railroad grate bars	5.50 to	6.00
Stove plate	5.50 to	6.00
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	10.00 to	10.50
Railroad malleable	10.00 to	10.50
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$9.00 to	$9.50
No. 2 heavy melting scrap	7.50 to	8.50
Scrap rails	7.00 to	7.50
New hydraul. comp. sheets	7.50 to	8.50
Old hydraul. comp. sheets	6.50 to	7.50
Drop forge flashings	7.50 to	8.50
No. 1 busheling	7.50 to	8.50
Hvy. steel axle turnings	6.50 to	7.00
Machine shop turnings	4.50 to	5.00
Knuckles and couplers		9.00
Coil and leaf springs		9.00
Rolled steel wheels		9.00
Low phos. billet crops	10.50 to	11.50
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	3.75 to	4.25
Cast iron borings	3.75 to	4.25
No. 2 busheling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.50 to	10.00
No. 1 cupola cast	9.00 to	9.50
Stove plate	7.50 to	8.00
Steel rails, 3 ft. and under	10.50 to	11.50
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	8.50 to	9.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.00 to	$7.50
Scrap steel rails	7.00 to	7.50
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		9.00
Iron axles		9.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	7.50 to	8.00
No. 1 cast	8.00 to	8.50
Tramcar wheels		8.00
Cast iron borings, chem.		8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$7.50 to	$8.00
No. 1 heavy melting	7.50 to	8.00
No. 2 heavy melting	7.00 to	7.50
No. 1 locomotive tires	5.00 to	5.50
Misc. stand.-sec. rails	7.50 to	8.00
Railroad springs	8.50 to	9.00
Bundled sheets	2.00 to	2.50
No. 2 railroad wrought	7.50 to	8.00
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	1.25 to	1.75
Rails for rolling	8.00 to	8.50
Machine shop turnings	1.25 to	1.75
Heavy turnings	3.00 to	3.50
Steel car axles	9.50 to	10.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	6.25 to	6.75
No. 1 railroad wrought	5.00 to	5.50
Steel rails less than 3 ft.	8.00 to	8.50
Steel angle bars	8.00 to	8.50
Cast iron carwheels	5.50 to	6.00
No. 1 machinery cast	7.00 to	7.50
Railroad malleable	6.00 to	6.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.50 to	7.00
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 30 lb. and over	$20.00 to	$21.00
Agricult. malleable	4.00 to	4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.25 to	$5.75
Scrap T rails	5.00 to	5.50
Machine shop turnings	2.50 to	2.75
Cast iron borings	2.00 to	2.25
Bundled skeleton, long	3.50 to	3.75
Forge flashings	3.50 to	3.75
Shafting	6.25 to	6.75
Steel car axles	8.50 to	9.00
Wrought pipe	2.50 to	3.00
Rails for rerolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$6.25 to	$6.50
No. 1 machinery cast	6.25 to	6.50
Stove plate	3.25 to	3.50
Railroad malleable	7.50 to	8.00

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$6.00 to	$6.50
No. 2 heavy melting steel	4.50 to	5.00
Heavy melting steel (yard)	....	4.00
No. 1 heavy breakable cast	5.50 to	5.75
Stove plate (steel works)	3.00 to	3.25
Machine shop turnings	....	2.50
Short shoveling turnings	....	2.50
Cast borings	1.50 to	2.00
No. 1 blast furnace	1.50 to	2.00
Steel car axles	8.50 to	9.00
Spec. iron and steel pipe	$3.00 to	$3.25
Forge fire	2.75 to	3.00
No. 1 railroad wrought	5.00 to	5.50
No. 1 yard wrought long	3.25 to	3.50
Rails for rolling	5.00 to	5.50
No. 1 cast	5.50 to	5.75
No. 2 cast	4.50 to	4.75
Stove plate (foundry)	....	4.50
Cast borings (chemical)	6.00 to	6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	5.00 to	5.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.50 to	$7.00
Scrap rails for melting	7.25 to	7.75
Loose sheet clippings	1.75 to	2.25
Bundled sheets	4.25 to	4.75
Cast iron borings	3.50 to	4.00
Machine shop turnings	3.25 to	3.75
No. 1 busheling	4.50 to	5.00
No. 2 busheling	2.75 to	3.25
Rails for rolling	7.75 to	8.25
No. 1 locomotive tires	7.25 to	7.75
Short rails	10.00 to	10.50
Cast iron carwheels	7.25 to	7.75
No. 1 machinery cast	6.75 to	7.25
No. 1 railroad cast	6.25 to	6.75
Burnt cast	4.50 to	5.00
Stove plate	4.50 to	5.00
Agricultural malleable	7.75 to	8.25
Railroad malleable	8.00 to	8.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$8.00 to	$8.50
Borings and short turnings	6.00 to	6.50
Long turnings	5.00 to	5.50
No. 1 machinery cast	8.00 to	8.50
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	7.75 to	8.25
Stove plate	4.00 to	4.50
New No. 1 busheling	6.25 to	6.75
Old No. 2 busheling	4.00 to	4.50
Sheet clippings	3.50 to	4.00
Flashings	5.00 to	5.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$8.00
Rails, scrap	7.00	8.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	10.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	2.45c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.10c.
Galv. sheets (No. 24), 25 or more bundles	3.35c.
Hot-rolled sheets (No. 10)	2.65c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.61
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per keg	2.20

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.

Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.55c. to 1.70c.
Rail steel reinforcement	1.30c. to 1.45c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	3.50c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg lots)	2.75c.
Rivets, boiler (keg lots)	2.75c.

Per Cent Off List

Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

Base per Lb.

Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	5.75c. to 6.25c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.54c.
Flats and squares	4.04c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	2.60c.
Hot-rolled ann'l'd sheets (No. 24*)	3.25c.
Galvanized sheets (No. 24*)	3.50c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ⅛ x ⅝ in. and larger; smooth finish, 1 to 2½ x ¼ in. and larger	3.40c. 3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.65

Per Cent

Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	62.65

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10) up to and inc. 48 in. wide	3.00c.
over 48 in. wide	3.15c.
Black corrug. sheets (No. 24)	3.75c.
Galv. corrug. sheets	4.05c.
Structural rivets	4.00c.
Boiler rivets	4.00c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 60 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.35c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.15c.
†Galvanized sheets (No. 24)	3.50c.
*Hot-rolled annealed sheets (No. 10)	2.70c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

* Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

Base per Lb.

Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. steel bars	2.95c.
Flat rolled steel under ¼ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.50c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10

* Net base, including boxing and cutting to length.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.90c.
Cold-fin. rounds and hex.	3.32c.
Squares and flats	3.32c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.35

Net per 100 Ft.

Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

Base per Lb.

Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	3.75c.
Bands	3.36c.
Hoops	3.55c.
Hot-rolled sheets (No. 10) 48-in. and narrower	3.00c.
Wider than 48-in.	3.25c.
Com. wire nails, base per keg	$2.40
Black wire, base per 100 lb.	3.25

BOSTON

Per Lb.

*Beams, channels, angles, tees, zees	3.00c.
*H beams and shapes	3.00c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.00c.
Floor plates, diamond pattern	5.25c.
*Bar and bar shapes (mild steel)	2.90c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.40c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, hf. ovals, ovals and bevels	4.15c.
Tire steel, rd. edge 1½ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	3.15c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized sheet sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

* Base prices for 15,000 lb. orders, extras apply for smaller quantities.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates	2.80c.	3.90c.	3.00c.
Shapes	2.15c.	3.30c.	3.00c.
Soft steel bars	3.15c.	3.30c.	3.00c.
*Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.70c.	4.20c.	4.25c.
Hot - rolled sheets (No. 10)	3.07½c.	3.80c.	3.50c.
Galv. sheets (No. 24)	4.30c.	4.50c.	4.75c.
*Struc. rivets, ⅛ in. and larger	5.75c.	6.00c.	5.25c.
*Cold finished steel Rounds	5.50c.	5.50c.	5.50c.
Squares and hexagons	6.75c.	6.75c.	6.75c.
Flats	7.25c.	7.25c.	7.25c.

Nails—base per keg

less carload:			
Com. 4-60d.	$2.40	$2.40	$2.50
S. or 4-20d.	2.40	2.40	2.50
Finish 6 & 8d.	2.40	2.40	2.50
All others	2.40	2.40	2.50

* Subject to deductions for quantity.

PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

Haffenreffer & Co., 30 Bismarck Street, Boston, Theodore C. Haffenreffer, president, has acquired former brewing plant of American Brewery, 249 Heath Street, Roxbury, Mass., and will remodel for branch plant. Cost over $100,000 with machinery.

Board of County Commissioners, Court House, Dedham, Mass., asks bids until May 16 for oil-burning equipment for County institution, Village Avenue.

Westfield River Paper Co., Inc., Russell, Mass., Paul F. Moore, vice-president, has purchased paper mill of Mountain Mill Co., Lee, Mass., in receivership, idle for several years, and will improve for branch plant.

Bridge Air Conditioning Corpn., Springfield, Mass., has been organized by Merrill H. and Robert P. Bridge, Hazardville, Conn., capital $50,000, to manufacture air-conditioning and mechanical draft equipment, parts, etc.

Kent Brewing Co., Inc., West Warwick, R. I., care of Joseph C. Cournoyer, 215 Providence Street, recently organized by Mr. Cournoyer and associates, has acquired former mill No. 2 of B. B. & R. Knight Corpn., near West Warwick, and will remodel for new plant. List of machinery required is being arranged. Cost over $75,000.

Stanley Works, New Britain, Conn., has added to its products a line of materials for erection of miniature buildings, and expects to get into large quantity production this month.

Underwood-Elliott Fisher Co., Bridgeport, Conn., closed for nearly a year, will shortly begin production of adding and bookkeeping machines and cash registers. Equipment will be moved from Rockford, Ill.

NORTH ATLANTIC

Hartol Products Corpn., 117 Liberty Street, New York, oil products, has acquired property at Texas City, Tex., for new oil terminal, for capacity of about 300,000 bbl. Cost over $85,000 with equipment.

Pioneer Air Compressor Co., 243 Canal Street, New York, manufacturer of air compressors, spray equipment, etc., and Governor Heat Regulator Co., same address, an affiliated organization, manufacturer of furnace heat control devices, blower systems, etc., have taken over three floors in building at 33 Warren Street, for expansion.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 16 for one motor-driven water vapor generator cleaning machine (Schedule 50); until May 23, two refrigerating equipments and spare parts (Schedule 9948) for New York Navy Yard.

Liska Machine Works, Inc., New York, has been organized by Charles R. Liska, Congers, N. Y., and Charles E. Ash, Blanche Avenue, Harrington, N. Y., to manufacture machinery and parts.

Allied Fastener Corpn., New York, has been organized by Richard Burns, 171 Stanley Avenue, Yonkers, N. Y., and associates, to manufacture metal fasteners, slide fasteners and kindred products.

General Crushed Stone Co., Drake Building, Easton, Pa., is considering new plant for production of bituminous concrete at Horseheads, N. Y. Cost over $40,000 with equipment.

Schock, Gusmer & Co., Inc., 857 Tenth Avenue, New York, manufacturer of brewing machinery, parts, etc., has taken title to former plant of Federal Metal Bed Co., Hoboken, N. J., about 85,000 sq. ft. floor space, for new plant.

Public Service Electric & Gas Co., Terminal Building, Newark, N. J., plans steel tower transmission lines over Hackensack River, near Kearny, N. J., consisting of two open-wire crossings, each of six 500,000 c.m. copper cable.

Paterson Brewing Co., Governor and Straight Streets, Paterson, N. J., is planning extensions and improvements, including additional equipment. Cost about $75,000 with machinery. Company has arranged for sale of stock totaling over $150,000, portion to be used for work noted.

Sterilized Razor Blade Co., 30 Church Street, New York, manufacturer of razor blades, etc., has leased 4500 sq. ft., in factory at 26 Cornelison Avenue, Jersey City, N. J., for new plant and will remove to new location.

Christian Feigenspan Brewing Corpn., 50 Freeman Street, Newark, has been organized by Christian W. Feigenspan and associates to take over brewing plant, location noted. New company plans expansion and improvements, including equipment. Cost over $100,000 with machinery.

Lester Engineering Co., 621 Cherry Street, Philadelphia, engineering specialties, has leased floor in building at 137 North Street, for new plant.

Fidelity Machine Co., 3908 Frankford Avenue, Philadelphia, manufacturer of knitting machinery and parts, has arranged with Jacob K. Altemus Machine Co., Philadelphia, to manufacture line of textile machinery, including Altemus winders, etc. Latter company will remove to Fidelity plant, where expansion will be carried out.

Department of Properties and Supplies, Bureau of Engineering and Construction, Capitol Building, Harrisburg, Pa., asks bids until May 17 for steam power house for central heating service, automobile service and garage building at institution at Lehighton, Pa.

Standard Brewing Co., Penn Avenue and Walnut Street, Scranton, Pa., has approved plans for extensions and improvements, and will install additional equipment. Cost over $65,000 with machinery.

Ross Heater & Mfg. Co., Inc., Buffalo, has been organized by Scott C. Ross, Buffalo, and associates, capital $200,000, to manufacture heating equipment, mechanical ventilating devices, etc. Company will take over concern of same name at 1407 West Avenue.

Pennsylvania-Dixie Cement Corpn., 60 East Forty-second Street, New York, has resumed operations at mill at Portland Point, near Ithaca, N. Y., after shut down for a year, recalling about 135 men.

SOUTH ATLANTIC

Gunther Brews, Inc., 1211 South Conkling Street, Baltimore, has awarded general contract to Cogswell Construction Co., 400 Park Avenue, for two one-story additions, 52 x 76 ft., and 40 x 85 ft., for extensions in bottling works, storage and distributing plant, in connection with expansion in main brewery. Cost about $60,000 with machinery. C. H. Osborne, 222 West Franklin Street, is engineer.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until May 16 for auto body steel sheets, brass castings, brass tubing, aluminum finish molding, iron strap, angle iron, aluminum tanks, gasoline tanks, valves, wrenches and other supplies (Circular 112).

Board of District Commissioners, District Building, Washington, asks bids until May 22 for cast lamp post parts; until May 19, 35,000 sheets of steel, 13 x 61 in. or alternate bid for 350,000 pieces of steel.

Town Council, Culpeper, Va., has been authorized to arrange fund of $120,000 for municipal electric light and power plant.

Glenn L. Martin Co., Middle River, Baltimore, is increasing production at aircraft plant and will add about 300 men to force. Company has secured award for three 50 passenger trans-oceanic type flying boats from Pan American Airways, Inc., New York, to cost over $700,000.

Gas Appliances, Inc., Miami, Fla., has been organized by N. R. Field, Bank of Bay Biscayne Building, and associates, to manufacture gas-burning equipment and devices.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 16 for one motor-driven toolmakers' precision lathe (Schedule 35) for Anacostia, Md., Navy Yard; tungsten and high speed steel hacksaw blades (Schedule 9985) for Brooklyn, Mare Island and San Diego yards; four motor-driven circular saws (Schedule 22), conduit pipe (Schedule 2), motor-driven trimming and squaring shears (Schedule 82); until May 23, circular and hand band saws, and miter boxes (Schedule 9), 200,000 lb. railroad rails and 10,000 lb. splice rail bars (Schedule 31), 12 pneumatic drills and 45 pneumatic hammers (Schedule 12), screw anchor shackles (Schedule 45), about 500 lubricating guns (Schedule 63), all for Eastern and Western yards; 1296 hand drills (Schedule 47) for Brooklyn, Mare Island and Puget Sound yards.

CENTRAL DISTRICT

Enterprise Can Co., Chambers Street, Pittsburgh, let general contract to Austin Co., Cleveland, for two-story addition, 100 x 270 ft., to plant at McKees Rock. Cost about $125,000 with equipment.

Rotaprint Co., Washington, Pa., care of Chamber of Commerce, Washington, is considering new plant for manufacture of duplicating machines and parts. Company is concluding negotiations for lease of property and plans early installation of equipment.

Berwind-White Coal Co., Windber, Pa., plans rebuilding machine shop and storage and distributing unit, recently destroyed by fire. Loss over $80,000 with equipment.

Tube City Brewing Co., McKeesport, Pa., will make extensions and improvements, including additional equipment. Cost close to $50,000 with machinery.

Department of Public Service, City Hall, Cleveland, William J. Kennedy, director, plans early call for bids for new municipal garbage and refuse incinerator plant. Cost over $600,000 with machinery. City Engineering Division, address noted, is engineer.

Ohio Power Co., Newark, Ohio, has authorized new power transmission lines from generating plant at Philo, Ohio, to Mishawaka, Ind. Cost over $600,000 with switching and power substation structures.

Imperial Instruments, Inc., Akron, Ohio, care of Schwab & Peters, First Central Trust Building, Akron, representatives, has been organized by H. F. Arnold, Akron, and associates, to manufacture precision instruments and kindred equipment.

Schaller Brewing Co., 1622 Main Street, Cincinnati, will make extensions and improvements, including additional equipment. Cost over $75,000 with machinery. Jacob J. Rueckert, Plymyer Building, is architect; William E. Bodenstein, Second National Bank Building, is consulting engineer.

Department of Public Works, Conneaut, Ohio, will take bids soon for electric-operated pumping machinery, filtration and other equipment, pipe lines, etc., for new pumping plant and water system extensions. Cost about $250,000. George B. Gascoigne, Leader Building, Cleveland, is consulting engineer.

Willard Storage Battery Co., East 133rd Street and St. Clair Avenue, Cleveland, subsidiary of Electric Storage Battery Co., Philadelphia, has let general contract to Gillmore-Carmichael-Olson Co., 4300 Euclid Avenue, for two-story addition, 90 x 200 ft. Cost about $90,000 with equipment.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until May 15 for wheel, axle and brake assemblies (Circular 506), container assemblies (Circular 523); until May 16, 11 portable electric saws (Circular 594), one 5-ton roller with tractor hitches (Circular 591); until May 17, 3600 running lamp assemblies (Circular 577), 130 bomb release handle assemblies (Circular 580); until May 22, 500 volt-ammeter assemblies (Circular 557), 28 filters, 1¼-in. iron pipe size (Circular 590), 60 steel trays and 60 adjustable steel stands for trays (Circular 587); until May 23, 40 cooling system auxiliary tank brackets, 40 cooling system centrifuge chamber assemblies, 80 cooling system centrifuge chamber to radiator tubes, 40 cooling system auxiliary tank to radiator tubes (Circular 569), 475 aircraft storage batteries (Circular 563), 500 tachometer assemblies (Circular 565); until May 24, 95 electric drills (Circular 597).

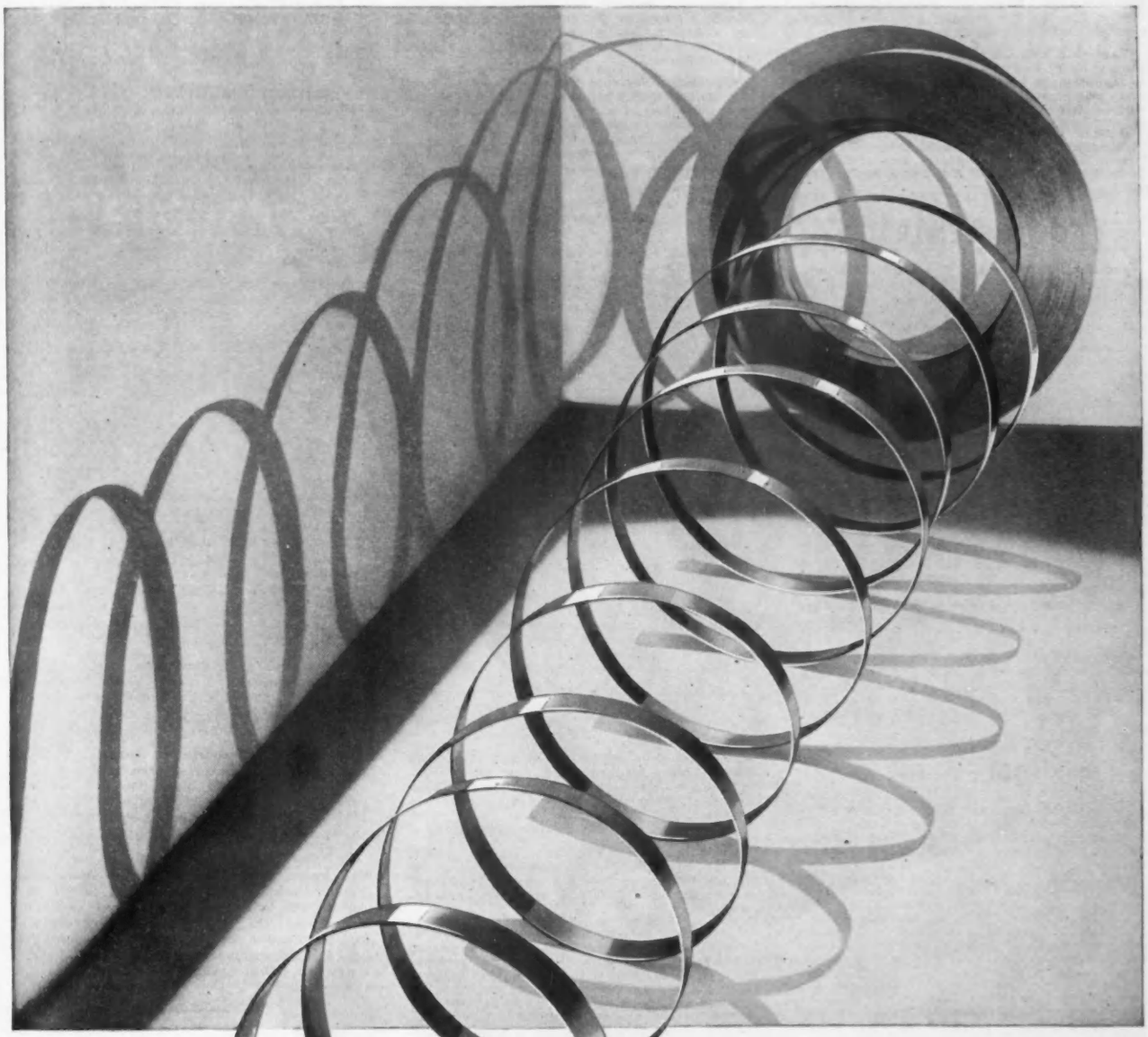
Miami Valley Brewing Co., First and Beckel Streets, Dayton, Ohio, plans addition, including modernization of present brewery, with installation equipment. Cost over $100,000.

Carl J. Kiefer, Schmidt Building, Cincinnati, consulting engineer, will prepare plans for extensions and improvements in a brewery at Middletown, Ohio, operated by George and Ralph Sebald, Middletown, who are organizing company to carry out program. Cost about $65,000 with equipment.

United States Engineer Office, Detroit, asks bids until May 16 for two motor-driven air compressor units (Circular 58).

Strand-Steel Corpn., 3600 Military Avenue, Detroit, has been organized by Carl A. Strand, 8429 Epworth Boulevard, and associates, to operate a steel fabricating works.

Fremont Canning Co., Fremont, Mich., let general contract to Owen-Ames-Kimball Co.,



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ROEBLING FLAT WIRE

Grand Rapids, Mich., for two-story addition, 100 x 175 ft., for storage and distribution. Cost about $45,000 with equipment.

Yard-man Co., Jackson, Mich., recently organized by T. B. Funk, Jackson, and associates, to manufacture new type noiseless lawn mower and parts, will occupy part of plant of Automotive Fan & Bearing Co.

Remote Control Lock Corpn., Detroit, has been organized by Reuben Allender, 258 East Vernor Highway, and asociates, capital $50,000, to manufacture special locks and locking devices.

SOUTH CENTRAL

American Brewery Co., 730 Bienville Street, New Orleans, is planning expansion and improvements, including new equipment. Cost over $60,000. Samuel Stone, Jr. & Co., Masonic Temple Building, are architects.

Memphis Steel Co., Memphis, Tenn., has been organized by Dyke Brothers, Fort Smith, Ark., manufacturers of steel window frames, door frames, etc., to operate as an affiliated interest at first noted place. Building has been leased at Tennessee and Nettleton Streets, Memphis, for factory branch, storage and distributing plant.

Georgia Silica & Mineral Co., Etowah, Tenn., recently organized by John D. Parks, Etowah, and associates, has plans for three-story silica grinding mill, 50 x 80 ft. Cost over $45,000 with machinery.

Tennessee Brewing Co., Memphis, Tenn., recently formed by C. M. Bishop, head of Floyd Piano Co., 162 Madison Avenue, and associates, plans new multi-story brewery. Cost about $175,000 with equipment. W. C. Laning, Wichita Falls, Tex., is interested in new company.

Common Council, Muscle Shoals, Ala., has called special election, May 29, to approve erection of municipal electric distributing plant and transmission line to Wilson Dam, about 20 miles. Cost over $75,000 with equipment.

MIDDLE WEST

International Harvester Co., 606 South Michigan Avenue, Chicago, plans addition to branch plant at East Moline, Ill., for parts production and assembling. Cost over $150,000 with equipment.

Rockford Brewing Corpn., 120 Prairie Avenue, Rockford, Ill., let general contract to Joseph Scandroli & Son, 283 North Madison Street, for extensions and improvements. Additional equipment will be installed. Cost about $50,000 with machinery.

City Council, Rockford, Iowa, plans call for bids for equipment for municipal electric light and power plant; also for electrical distributing system. Cost $105,000 with equipment. H. L. Cory Co., Redick Tower Building, Omaha, Neb., is consulting engineer.

Jacob Schmidt Brewing Co., 882 West Seventh Street, St. Paul, Minn., let general contract to W. W. Magee Co., 118 West Central Avenue, for one-story bottling works, 52 x 140 ft.

Kalispell Malting & Brewing Co., Kalispell, Mont., Edward R. Gay, manager, has plans for extensions and improvements, including additional equipment. Cost over $45,000 with machinery.

Globe Type Foundry, Inc., 958 West Harrison Street, Chicago, has leased about 37,000 sq. ft. in building at Jefferson and Van Buren Streets, more than double area of present works for new plant.

Common Council, Groton, S. D., is considering erection of municipal electric light and power plant. Cost about $54,000 with equipment. J. W. Emberg, Madison, S. D., is consulting engineer.

Great Falls Brewery, Inc., Great Falls, Mont., Paul W. Kuschel, general manager, let general contract to Ferche & Karaffa, Great Falls, for one-story bottling plant, 60 x 100 ft., in connection with general extensions and improvements. Cost about $40,000 with equipment.

Davis & Thompson Co., 6619 West Mitchell Street, Milwaukee, manufacturer of high-speed milling machines and other tools, has purchased business of Planigressive Reducer Co., 2737 South Twenty-eighth Street, Milwaukee, manufacturer of gear reducing equipment. Production has been consolidated at Davis & Thompson plant.

Cream City Brewing Co., 1512 North Thirteenth Street, Milwaukee, has been authorized to make new issue of $100,000 preferred stock for reconditioning entire plant.

Gustave E. Strandt, 2517 North Forty-seventh Street, Milwaukee, designing and manufacturing engineer, has placed contracts for new machine shop, 30 x 108 ft. Cost about $20,000 with equipment.

Wisconsin Grey Iron Foundry Co., 4432 West Burnham Street, Milwaukee, which suffered recent fire loss of nearly $100,000, plans either to reconstruct main foundry or lease existing building and install new equipment. Pattern shop and pattern storage building were saved.

A. O. Smith Corpn., Milwaukee, has started regular production of welded steel beer barrels, in new division, at initial rate of 1000 a day, and has recalled 450 men working three 8-hr. shifts.

American Products Co., 3045 West Walnut Street, Milwaukee, will remodel Mann malt warehouse into brewing and bottling plant for occupancy by newly organized Fischbach Brewing Co., controlled by same interest. Walter Fischbach is president of both concerns.

SOUTHWEST

Corn Products Refining Co., Brokers Building, Kansas City, Mo., is planning expansion and improvements in plant at North Kansas City. Cost close to $60,000 with equipment. Headquarters are at 17 Battery Place, New York.

City Council, Paragould, Ark., has plans for municipal electric light and power plant, and electric distributing system. Fund of $100,000 is available. W. A. Fuller & Co., 2916 Shenandoah Avenue, St. Louis, are consulting engineers.

Falstaff Brewing Corpn., 3684 Forest Park Boulevard, St. Louis, let general contract to Anton Beffa, 1240 North Jefferson Street, for two-story and basement addition, 90 x 119 ft., to bottling plant, comprising part of expansion program to cost about $300,000.

Louis Obert Brewing Co., 2700 South Twelfth Street, St. Louis, plans extensions and improvements in brewery, including equipment. Cost about $125,000 with machinery.

Stephens Refining Co., Stephens, Ark., has approved plans for oil refinery near city. Company recently acquired Kettle Creek Refining Co., El Dorado, Ark., and will concentrate operations at new plant site. Cost over $70,000. W. B. Hassett is general manager.

Sentinel Products Co., 2615 Walnut Street, Kansas City, Mo., has been organized by Charles G. Halstead and Charles F. Conkey, to manufacture tools and mechancial equipment.

American Airways, Inc., Southern Division, Love Field, Dallas, Tex., let general contract to Thomas S. Byrne, Inc., Fort Worth National Bank Building, Fort Worth, Tex., for hangar, 135 x 200 ft., and two-story lean-to, 25 x 140 ft., for repair shop, at Fort Worth. Cost over $100,000 with equipment. A. Epstein, 2001 West Pershing Road, Chicago, is architect and engineer.

Quartermaster Supply Officer, Fort Sam Houston, Tex., asks bids until May 17 for saw blades, cutting punches, horse-shoeing rasps, 50 cross-cut saws, 300 coal shovels, 60 scythes, tacks and other supplies (Circular 194).

PACIFIC COAST

Golden West Brewery Co., Seventh and Kirkham Streets, Oakland, Cal., recently reorganized with George J. White, president, plans expansion and improvements, including new equipment. Cost about $100,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 16 for one motor-driven bench press and one motor-driven floor stand press (Schedule 23) for Mountain View, Cal., Navy Yard; until May 23, 504 pneumatic rivet sets (Schedule 37), one steam retort for wood-steaming (Schedule 36) for Puget Sound yard; 17,000 steel containers, each with capacity of 50 to 55-gal. (Schedule 39) for San Francisco yard.

Peoples Light & Power Co., Loa, Utah, is considering new electric light and power plant in Grass Valley district, near Koosharem, Utah. Cost over $70,000 with transmission lines.

Wenzel & Henoch Construction Co., Fifth and California Streets, Beaumont, Cal., let general contract to O. E. Brown, Beaumont, for one-story machine shop, 100 x 200 ft. Cost over $40,000 with equipment.

Monte Cristo Brewing Co., Thirty-ninth Street and McDougall Avenue, Everett, Wash., has plans for extensions and improvements, including new equipment. Cost over $45,000 with machinery.

Fresno Brewing Co., 100 M Street, Fresno, Cal., let general contract to Fisher & McNulty, Martei Building, for extensions and improvements. Cost about $75,000 with equipment. Charles Butner, Cory Building, is architect.

Department of Water, Alhambra, Cal., T. B. Downer, water superintendent, plans installation of two turbine pumping engines, booster pumps and auxiliary equipment for extensions in water system in Rio Hondo district. Bond issue of $340,000 is being arranged. Burns-McDonnell-Smith Corpn., Western Pacific Building, Los Angeles, is consulting engineer.

Acme Brewery, 762 Fulton Street, San Francisco, plans extensions and improvements, including additional equipment. Cost about $125,000 with machinery.

William A. Wadleigh, 902 North Eighty-fifth Street, Seattle, has plans for one-story foundry, 40 x 66 ft. William G. Brust, Seattle, is architect.

Shell Oil Co., Shell Building, San Francisco, plans rebuilding part of oil refinery at Martinez, Cal., including bleaching house, destroyed by fire April 22. Loss over $100,000 with equipment.

FOREIGN

Ministry of Transportation, Teheran, Persia, has let contracts to Kampmann, Saxild & Co., and Saabye & Lerche Co., both Copenhagen, Denmark, and Nyquist & Holm Co., Stockholm, Sweden, for 600-mile trans-Persian railway from Caspian Sea to Gulf of Persia. Cost about 300,000,000 kroner ($60,000,000) including locomotive and car repair shops, fueling plants, rolling stock, etc. Equipment purchases will be made by Government.

Government of Finland, Helsingfors, plans call for bids soon for new nitrogen fixation plant at Imatra Falls, Finland, with initial capacity of about 4000 tons a year. Information at office of Finnish Ministry, Washington.

Ministry of Transportation, Istanbul, Turkey, plans new railroad in eastern provinces, extending to points on Black Sea and Mediterranean Sea, about 370 miles. Cost over $35,000,000 with car and locomotive repair shops, fueling plants, rolling stock, etc.

Railway Administration, State of Sao Paulo, Sao Paulo, Brazil, plans railway lines from Ponta Pora in Southern Matto Grosso to Aquidauana, and from Porto Epitacio to Ponta Pora, connecting with lines of Northwestern and Sorocabana railroads. Program includes car and locomotive repair shops and other structures. Cost about $5,000,000 with rolling stock.

Trade Notes

Florandin Equipment Co., 40 West Fortieth Street, New York, has been appointed distributer in New York and New Jersey for the Hansen arc welder, manufactured by Harnischfeger Sales Corpn., Milwaukee.

Morrison Metalweld Process, Inc., Buffalo, engaged in welding engineering and contracting, has moved its Chicago office from its Chicago plant to the Great Northern Building, 20 West Jackson Boulevard.

Taunton, Mass., has purchased forced and draft fans from the B. F. Sturtevant Co. and turbine and condensers from the Westinghouse Electric & Mfg. Co.

Harnischfeger Corpn., 4401 West National Avenue, Milwaukee, has instituted a change in its sales policy with respect to its line of P & H-Hansen arc welding units. Sales in the Milwaukee territory henceforth will be in charge of Robert E. Young, district manager of excavator sales, and Alex Paulsen, district manager of overhead crane sales, instead of the welder agency formerly employed.

Monarch Machine Tool Co., Sidney, Ohio, manufacturer of lathes, announces the removal of its Chicago office from 547 West Washington Boulevard to 622 West Washington Boulevard, where greater facilities will be used to exhibit and demonstrate representative equipment. The company also announces a change in location of its New York office from room 857 Graybar Building, to room 413 of the same building.

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The Uses and Applications of Stainless Steels

(Continued from page 743)

of "18-8" for manufacture of varnish kettles, which gives considerably better service than the metals previously used. In textile industries, especially that department relating to dyeing operations, the use of proper metals has always been highly important because of the possible deterioration of color through contamination. Although this industry has been somewhat conservative in taking up the stainless alloys, experimental equipment of "18-8" is giving excellent results, and tests conducted with a large variety of dye stuffs show better averages than with metals which heretofore have been considered standard for dyeing machinery.

Other applications in which corrosive conditions are severe are for line hardware for telephone and telegraph lines, for marine hardware and fittings, for wire cable for yacht rigging, for parts for submarines, decks, super-structures, etc., laundry and washing machines, hospital equipment and utensils, golf club heads, ventilating and air conditioning systems, etc.

Stainless Steels in the Food Industry

Another great industry is vitally concerned with corrosion resistance and in addition demands equipment which is attractive in appearance. This is the food industry.

Certain of the stainless alloys are well adapted to the uses of this industry, especially the 18 per cent chromium 8 per cent nickel combination, because this is proof against corrosion from virtually all food products and easily fabricated. Even the dairy industry, which handles the most sensitive and easily spoilable commodities, has adopted this alloy as the metal which most satisfactorily meets their rigid requirements. For canning and preserving machinery, for brewery equipment, for candy and bread making, for soda fountain and ice cream cabinet tops, for slaughter and packing house equipment, stainless alloys are used everywhere. For restaurant and kitchen equipment and for utensils, stainless alloys possess extraordinary merit and utility.

The high resistance of iron-chromium alloys to oxidation is responsible for their non-tarnishable qualities under atmospheric exposure; and, in fact, the stainless alloys are the only commercial metals we know that possess this property. It is true that a certain minimum chromium content is necessary and that proper preparation of the surface is also necessary, but this does not alter the fact that these metals are unique in this respect.

This characteristic has drawn attention to their possibilities for decorative purposes where a permanent bright metallic finish is desired. One of the first applications for purely decorative effects was in the automobile industry as a replacement for nickel plating which tarnishes with great rapidity. The use of 18-8 for some years for radiator shells, lamps and minor trim by one of the largest manufacturers has well established its advantages. Smaller parts, such as hub caps, gasoline caps, cowl moldings, brackets, etc., are now regularly made from the 16-18 per cent chromium low carbon stainless steel. Pump shafts are made of hardenable 12-14 per cent chromium steel. "Butterfly" valves for carburetor by-pass are made from high chromium alloys, while for engine valves no material yet developed has proved more efficient than the high chromium silicon combination.

Architectural Application

The use of stainless metals for architectural decoration is an entirely new phase of the stainless development. Although the straight chromium stainless steels have been used for some years for bank vaults and safety deposit box construction, it has been probably because of freedom from rusting and consequent lower maintenance cost rather than because of decorative effects.

Trends in architectural development during recent years have been away from gaudy, over-decorated details. Simplicity is demanded, and such metals as the stainless steels which retain their bright finish are well adapted to carry out this scheme. They are advantageous from the standpoint of both artistic effect and the more utilitarian aspect of lower maintenance charges, for non-corrodible metals require a minimum of care, and the necessity for inevitable and costly repainting is avoided.

The most striking and the first of the outstanding applications of stainless alloys in architecture are the Chrysler and Empire State Buildings in New York City. "18-8" has been used for both buildings, which have now been completed for several years. The freedom from rust and tarnish on this installation is an excellent demonstration of the suitability of this alloy for the purpose. Other installations are in the Earl Carroll Theater, New York City, the Philadelphia Savings Fund Society Building in Philadelphia, the W.C.A.U. Broadcasting Station Building in Philadelphia, the Wagner Building in the Bronx, the Insurance Company of North America Building in New York, and in Radio City there is much stainless used for decoration in doors, stairway and balcony railings, plaques on the outside walls, etc.

In the uses and applications so far described, corrosion resistance has been the factor which determined usage. But applications for engineering purposes in which high physical properties are required have been just as important.

One of the most interesting of these is the use of 12-14 per cent chromium stainless steel for steam turbine blading. The resistance of this material to the cutting action of high pressure steam and the excellent physical properties developed on heat treatment have made it virtually standard for this application and its frequent use by the United States Navy is well known. Almost equally important is the use of this same analysis for valve trim, seats and discs, for high pressure steam lines where much longer life is secured than with use of other metals.

The benefits resulting from intelligent use of stainless steel parts are equally evident in hydraulic work. Pump rods, piston rods, rams, as well as valve parts, made from hardenable analyses, show excellent wearing qualities and result in increased life of packings, reduction of loss from leakages and lower frictional loss.

Chromium alloys are noted for high resistance to abrasion, and this resistance is found also in stainless steels, in consequence of which they are finding employment where this is demanded.

In the coal mining industry, shaker screens of 12-14 per cent low carbon chromium stainless steels are supplanting bronze or other metal screens previously used. The wearing qualities of the stainless metal are so superior that it is possible to use metal two or three gages lighter and still secure longer life and although the first cost is higher stainless alloy is more economical in the long run. Even the homely domestic coal truck is now being equipped with stainless chutes for delivering coal through the cellar window.

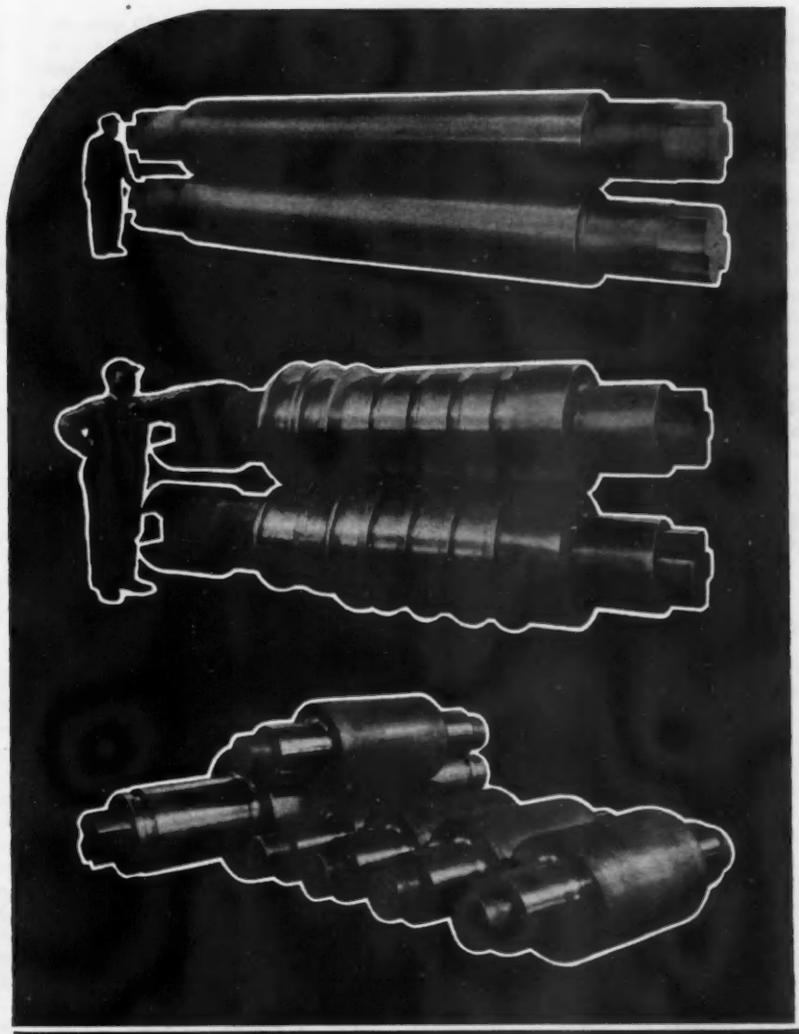
In chemical industries various stainless alloys of appropriate composition have long been used for bolts, nuts, studs, etc., for both low and high temperature service.

As a Light Weight Structural Material

One of the most recent and interesting developments is the use of 18-8 as a light weight structural material. This alloy, being austenitic, may be hardened materially by cold working. This property, which has usually been regarded as detrimental, has been used advantageously for the production of cold rolled light gage strip with tensile strength of 150,000 to 180,000 lb. per sq. in. By suitable fabrication methods this has been formed into light weight structural members of great strength and rigidity, the non-corrosive properties of the metal making these permanent.

Such structural material has been employed in the successful construc-

(Concluded on page 14)



Plain Chilled Iron

Molybdenum Chilled Iron

Sand Iron

Sand Iron Chilled Pass

Alloy Iron

Alloy Chilled Grain Iron

Alloy Iron Fine Grain

Carbon Steel

Mesta Special Alloy Steel (Heat Treated)

Mesta Chrome Molybdenum

Mesta "Hardened Chill" (Mild-Medium-Hard)

Mesta Hardened (Mild-Medium-Hard)

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tion of airplanes, rail cars, motor buses, etc. Its use results in a saving of weight in railway passenger coaches of 75 per cent or more, which will mean considerable economy in operating charges. Engineering research is now under way to apply this development to other types of structures, such as bridges, buildings, ships, etc. It is interesting to note that it is now being considered for construction of a ninety-foot mast for a naval vessel.

There can be no question that the future possibilities of a material which combines high strength and rigidity with lightness of weight and permanency are very great, and it is not improbable that startling innovations in engineering practice may be expected from this development.

A Word About Costs

In conclusion, a word or two regarding costs will be in order. It is scarcely possible that the price of even the cheapest of the stainless alloys will ever be as low as that of ordinary carbon steel, or even approach it. It should be emphasized, and strongly so, that cost in terms of service is the best method of assessing values. Value should be judged by the service given, and when cost in terms of service is lower than that of other metals, the use of stainless alloys will be economical, no matter what the initial cost may be.

Malleable Orders Up in March

WASHINGTON, May 5.—Orders for malleable castings in March totaled 12,380 tons compared with 11,077 tons in February, according to reports received by the Bureau of the Census from 112 establishments. Shipments declined to 10,967 tons from 14,068 tons and production fell to 9756 tons from 13,575 tons. Orders in the first quarter of the present year totaled 35,861 compared with orders of 54,375 tons and 92,115 tons, respectively, for the corresponding periods of 1932 and 1931.

Ferroalloy Statistics For 1932

The shipments of ferroalloys of all classes in 1932 amounted to 218,646 gross tons, valued at $14,003,672, a decrease of 45 per cent in quantity and of 54 per cent in total value. The production of ferro-alloys in 1932 was 230,311 gross tons, as compared with 466,969 tons in 1931, a decrease of 51 per cent. These statistics come from a recent Mineral Market Report of the U. S. Bureau of Mines.

The production of ferromanganese in 1932 was 56,350 gross tons, containing 43,760 tons of manganese (metal), an average of 77.66 per cent of manganese. Ferromanganese was made at 5 furnaces by 5 producers in 1932. In the production of ferromanganese in 1932 there were used 90,677 gross tons of foreign manganese ore, 91 tons of foreign ferruginous manganese ore, 10,666 tons of domestic manganese ore, 1642 tons of domestic ferruginous manganese ore, 3537 tons of iron ore, and 1499 tons of cinder, scale, and scrap. The quantity of manganese ore used per ton of ferromanganese made in 1932 was 1.798 tons; in 1931 it was 1.799 tons; and in 1930 it was 1.792 tons. Of the foreign manganese ore used in 1932, Russia supplied 46,596 gross tons; Brazil, 25,279 tons; India, 11,541 tons; Africa, 5135 tons; and Cuba, 2126 tons. The quantity of domestic manganese ore used in the manufacture of ferromanganese in 1932 represented 10.5 per cent of the total manganese ore used, compared with 4.1 per cent in 1931.

The production of spiegeleisen in 1932 was 37,317 gross tons, containing 7461 tons of manganese (metal), an average of 19.99 per cent. Spiegeleisen was made at 4 furnaces by 3 producers in 1932.

The production of ferrovanadium in 1932 was 109 gross tons, containing 89,624 pounds of vanadium (metal), an average of 36.73 per cent of vanadium. The shipments of ferrovanadium in 1932, amounting to 283 tons, contained 235,118 pounds of vanadium, and the average value per pound of contained vanadium was $2.99 f.o.b. furnaces, compared with $3.13 in 1931.

The production of ferrotungsten in 1932 was 246 gross tons, containing 440,918 pounds of tungsten (metal), an average of 79.88 per cent of tungsten. The shipments of ferrotungsten in 1932, amounting to 295 tons, contained 527,356 pounds of tungsten, and the average value per pound of contained tungsten was $1 f.o.b. furnaces, compared with $1.10 in 1931.

Pig Iron Statistics For 1932

According to a recent survey by the U. S. Bureau of Mines, the production of pig iron in 1932, exclusive of ferroalloys, was 8,549,649 gross tons, compared with 17,952,613 gross tons in 1931. The production in 1932 was 52 per cent less than in 1931 and 74 per cent less than the average for the preceding five years. In the production of pig iron in 1932 there were used 12,528,886 gross tons of domestic iron ore and manganiferous iron ore; 652,352 tons of foreign iron ore and manganiferous iron ore; and 1,954,710 tons of cinder, scale, and scrap—a total of 15,135,948 tons. An average of 1.770 gross tons of metalliferous materials was consumed per ton of pig iron made in 1932, as compared with 1.887 gross tons in 1931. The average consumption of ore per ton of pig iron made in 1932 was 1.54 tons compared with 1.70 tons in 1931. The lower consumption of ore in 1932 was due chiefly to the use of relatively larger quantities of reclaimed flue dust in a year of exceedingly subnormal operations.

The shipments of pig iron from blast furnaces in 1932, amounting to 8,518,400 gross tons, valued at $126,032,714, showed a decrease of 52 per cent in quantity and of 56 per cent in total value. The general average value of pig iron of all grades at the furnaces in 1932 was $14.80 a ton, compared with $16.01 in 1931.

The comparative shipments of gross tons of pig iron from the six leading producing states was as follows:

	1931	1932
Ohio	4,290,669	2,505,268
Pennsylvania	5,099,016	2,069,553
Alabama	1,617,331	733,774
Illinois	1,727,834	731,872
Indiana	1,721,925	713,415

Iron Ore Statistics For 1932

The iron ore mined in the United States in 1932 amounted to 9,846,916 gross tons, a decrease of 68 per cent compared with 1931, according to a recent report of the U. S. Bureau of Mines. The production in 1932 was the lowest since 1885 and was 83 per cent below the average for the preceding five years. Iron ore was produced at only 129 mines (and an undetermined number of small pits) in 10 States in 1932, compared with 186 mines (and an undetermined number of small pits) in 15 States in 1931.

The shipments of iron ore in 1932 amounted to 5,331,201 gross tons, valued at $12,898,011, a decrease of 81 per cent in quantity and of 83 per cent in total value, compared with 1931. The average value per ton of iron ore at the mines in 1932 was $2.42 against $2.60 in 1931.

The stocks of iron ore at mines at the end of 1932 amounted to 17,603,873 gross tons, an increase of 35 per cent. The stocks at the end of 1932 were about 7,642,000 tons above the average for the preceding five years. The stocks at the end of 1932 were the largest ever accumulated at the mines.

The comparative production in gross tons, in the three leading States was as follows:

	1931	1932
Minnesota	17,445,003	5,154,291
Michigan	7,552,581	2,554,996
Alabama	3,615,144	1,374,534

The proposed amalgamation in England of Dorman, Long & Co., Ltd., and the South Durham Steel & Iron Co., Ltd., will give the merger a capacity that will far exceed that of any other British steel company. In round numbers it will have the following capacities: In steel, 2,500,000 tons of ingots; in finished steel, 1,750,000 tons; in pig iron, 2,150,000 tons; in coal, 3,500,000 tons, and in ironstone, 3,250,000 tons.